Comprehensive Highway Safety Plan for Alabama

PREPARED WITH COOPERATION AND ASSISTANCE OF REPRESENTATIVES OF THE FOLLOWING AGENCIES AND ORGANIZATIONS

AGENCIES: Alabama Department of Transportation, Administrative Office of Courts, ABC Board, Alabama Department of Economic and Community Affairs, Alabama Department of Public Health, Alabama Department of Public Safety, Alabama Department of Senior Services, Federal Highway Administration-Alabama Division, Federal Motor Carrier Safety Administration-Alabama Division, National Highway Traffic Safety Administration-Southeast Regional Office, City of Montgomery Department of Transportation, City of Tuscaloosa Department of Transportation, City of Tuscaloosa Police Department, Elmore County Engineering Department, Montgomery County Human Resources Department, Montgomery County Sheriffs Office, and Regional Planning Commission of Greater Birmingham, State Safety Coordinating Committee.
ORGANIZATIONS: Alabama Optometric Association, Alabama Safe Kids, Alabama Section of the Institute of Transportation Engineers, Alabama Traffic Safety Center, Alabama Trucking Association, ALFA Insurance, Auburn University, Bellsouth, Children's Hospital, Eye Clinic of Prattville, MADD - Alabama Chapter, Operation Lifesaver, Southeast Alabama Medical Center, University of Alabama, and Voices for Alabama Children

UTCA

University Transportation Center for Alabama
The University of Alabama, The University of Alabama in Birmingham,
And The University of Alabama at Huntsville

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16. Abstract

In the United States, more than 40,000 motorists die annually and more than three million are injured. To address this carnage, the American Association of State Highway and Transportation Officials (AASHTO) adopted a thorough, all encompassing safety plan with 22 emphasis areas and 92 safety strategies. AASHTO wants to save 7,000-8,000 lives annually through stepwise implementation of the plan, with different states taking the lead for various plan components. The Alabama Department of Transportation (ALDOT) volunteered to be a lead state in addressing off-road crashes and in assembling a comprehensive safety plan.

ALDOT's plan was prepared using the expertise of state, federal and local traffic and safety professionals and the Safety Management, Action and Resources Task Force (SMART, composed of 75 members from 25 stakeholder organizations). As a result, almost 100 individuals from 31 agencies and organizations helped identify problems and prepare elements of the plan to address those problems. These individuals worked in teams for the duration of the project, so that their particular expertise could be applied to individual problems. Five primary emphasis areas were identified, based upon the factors that were found to contribute the most to fatal crashes in Alabama. The plan includes components for each of these emphasis areas: Emergency Medical Services, Restricted Drivers, Safety Legislation, Risky Driving, and Run-Off-Road crashes.

The intent is that implementation of the plan will be through multi-agency, multidisciplinary actions teams. The plan components will guide that implementation. The components include background information and statistics on fatal crashes, a series of recommended action items, and recommendations for organizing the action teams. In all cases, the components call for prioritization of funding so that resources will do the maximum amount of good for the citizens of Alabama.

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Executive Summary

In the United States, more than 40,000 motorists die annually and more than three million are injured. In Alabama, over 1,000 individuals die and 45,000 more are injured in 140,000 vehicular crashes each year. These are staggering statistics.

To address this carnage, the American Association of State Highway and Transportation Officials (AASHTO) adopted a thorough, all encompassing safety plan with 22 emphasis areas and 92 safety strategies. AASHTO wants to save 7,000-8,000 lives annually through stepwise implementation of the plan, with different states taking the lead for various plan components. The Alabama Department of Transportation (ALDOT) volunteered to be a lead state in addressing off-road crashes and in assembling a comprehensive safety plan.

ALDOT's plan was prepared using the expertise of state, federal and local traffic and safety professionals and the Safety Management, Action and Resources Task Force (SMART, composed of 75 members from 25 stakeholder organizations). As a result, almost 100 individuals from 31 agencies and organizations helped identify problems and prepare elements of the plan to address those problems. These individuals worked in teams for the duration of the project, so that their particular expertise could be applied to individual problems.

Five primary emphasis areas were identified, based upon the factors that were found to contribute the most to fatal crashes in Alabama. The plan includes components for each of the emphasis areas:

- Emergency Medical Services
- Restricted Drivers
- Safety Legislation
- Risky Driving, and
- Run-Off-Road crashes.

The intent is that the plan will be implemented through multi-agency, multidisciplinary actions teams over several years. The individual plan components will guide the implementation efforts of the individual teams. For that purpose, each plan component includes background information and statistics on fatal crashes pertinent to that component, a series of recommended action items, and recommendations for organizing the action team. In all cases, the components call for prioritization of funding so that resources will do the maximum amount of good for the citizens of Alabama.

The 100 study team members who contributed to the analysis of Alabama crashes and the development of individual plan components are justifiably proud of their efforts. The product of their hard work represents our best opportunity to substantially reduce the tragic number of deaths and serious traffic crashes in this state.

CHAPTER 1
INTRODUCTION

In the United States, 40,000 motorists die annually and more than three million are injured in traffic crashes. These are horrible numbers, but they have existed at this level or greater since 1940. The United States Department of Transportation (USDOT) and the American Association of State Highway and Transportation Officials (AASHTO) are determined to improve safety on the nation's highways. USDOT made safety its top priority and adopted aggressive goals for reducing fatalities and injuries from traffic crashes. AASHTO studied the crash situation and adopted an aggressive safety plan to mitigate the number of deaths and to reduce the death rate on the nation's highways.

The AASHTO Safety Plan

The AASHTO Strategic Highway Safety Plan is thorough and all encompassing. It contains 22 emphasis areas and 92 separate safety strategies that are intended to save 7,000-8,000 lives per year. National experts carefully crafted the plan, using national crash data, comprehensive literature reviews, and input from practitioners and government officials.

The National Cooperative Highway Research Program (NCHRP) prepared guidance materials in NCHRP Project 17-18(3) to help implement the AASHTO plan. NCHRP has already published several reports that address this topic, and more are under development. Examples include NCHRP Report 501, *Integrated Management Process to Reduce Highway Injuries and Fatalities Statewide*, and the first 13 volumes of NCHRP Report 500, *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan*. Two volumes of Report 500 were pertinent to this project: *Volume 4: A Guide for Addressing Head-On Collisions*, and *Volume 6: A Guide for Addressing Run-Off-Road Collisions*.

ALDOT Supports AASHTO Safety Effort

The AASHTO safety plan provides a good framework for planning state and local programs. With a comprehensive plan prepared by experts and good guidance documents, there is only one major step remaining – implementation. USDOT and AASHTO requested that highway agencies install and test various emphasis area strategies. AASHTO requested that each state highway agency adopt a statewide comprehensive safety plan and serve as a "lead state" in one of the primary traffic safety emphasis areas. On August 11, 2003, Mr. D. J. McInnes, Transportation Director for the Alabama Department of Transportation (ALDOT) responded to AASHTO President James C. Cordell, III indicating that ALDOT would support the AASHTO safety initiative by preparing a comprehensive safety plan and by becoming a lead state in the analysis of roadway departure crashes.

ALDOT engaged the University Transportation Center for Alabama (UTCA) of the University of Alabama to organize the project, provide technical support, work with managers from the ALDOT Multimodal Bureau Safety section and the Alabama Division of the Federal Highway

Administration (FHWA), and facilitate the many stakeholder activities necessary for such a comprehensive effort. The first step was a meeting of representatives of UTCA, ALDOT and FHWA to develop an outline for the twin efforts of the project (develop safety plan and analyze off-road crashes). This group was the "steering team" that constantly provided direction, resources and incentives to the volunteer members to manage the project's momentum.

Overview of the Project

Background information on Alabama Traffic Crashes

In many ways, Alabama is an average state. It has an average population, land mass, number of miles of roadway, and number of bridges. But in traffic crashes and mileage fatality rate, it is above average. The 10-year crash trends are shown in Table 1-1.

Table 1-1: 10 year trends for Alabama crash statistics[1]

Year	Crashes	Injuries	Fatalities	[2]Fatality Rate	[2]National Fatality Rate
1994	130,652	48,000	1,081	2.21	1.73
1995	133,682	48,100	1,113	2.20	1.73
1996	136,698	48,200	1,142	2.22	1.69
1997	139,606	49,300	1,190	2.23	1.64
1998	138,400	47,300	1,071	1.94	1.58
1999	137,723	47,100	1,148	2.03	1.55
2000	132,626	43,500	986	1.74	1.53
2001	133,739	42,917	998	1.76	1.52
2002	140,436	44,452	1,038	1.80	1.5
2003	141,067	44,845	1,001	1.71	1.48
Totals	1,364,629	463,714	10,768	---	---

[1]Data reported on a July 1- June 30 basis
[2]Fatalities per 100,000,000 miles of travel

During the 10-year period shown in the table, vehicle crashes increased about eight percent, while both injury and fatal crashes declined. While this was occurring, the number of miles driven in the state increased about 30 percent. On the surface this paints a good picture – severe crashes decreased in spite of increased miles driven and increased crashes.

But the simple and quick analysis in the previous paragraph ignores an overwhelming fact. The size of the crash problem is mind numbing. Over the past decade, there have been 1.35 million vehicle crashes, 46.4 thousand injury crashes, and 10,768 crash fatalities. As a measure of the magnitude of these numbers, the fatality total is about the same as the current population of Leeds, Alabama. If the City of Leeds disappeared today, there would be an uproar and the citizens of Alabama would not sleep until the cause had been found and fixed. Yet these huge numbers of crashes continue to occur. And they certainly point to the need for action.

Additional conclusions can be drawn from Table 1-1. For example, the fatality rate declined rapidly in the last five years in the table, after having been stable previous to that time. Since 1979 it has declined from 3.76 to its current rate of 1.71. This dramatic drop of 58 percent in 28 years is shown in Figure 1-1. However, further analysis of the table or figure, shows that

Alabama's death rate has been as much as 36 percent above the national average during this period, and has averaged 19 percent above the national picture for the past five years. This is important, and again it points to the need for action.

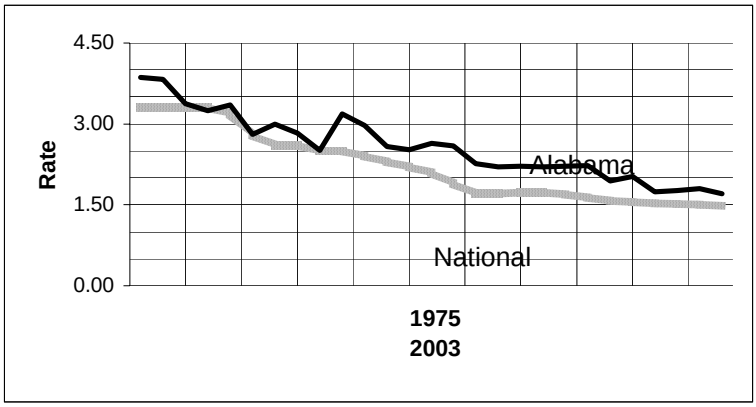

Figure 1-1: National and Alabama fatality rates (per 100,000,000 miles driven)

A more complete picture of crashes and travel characteristics is shown by Figure 1-2 and Table 1-2, which trace mobility and crash indicators since 1975. Three different trends are evident:

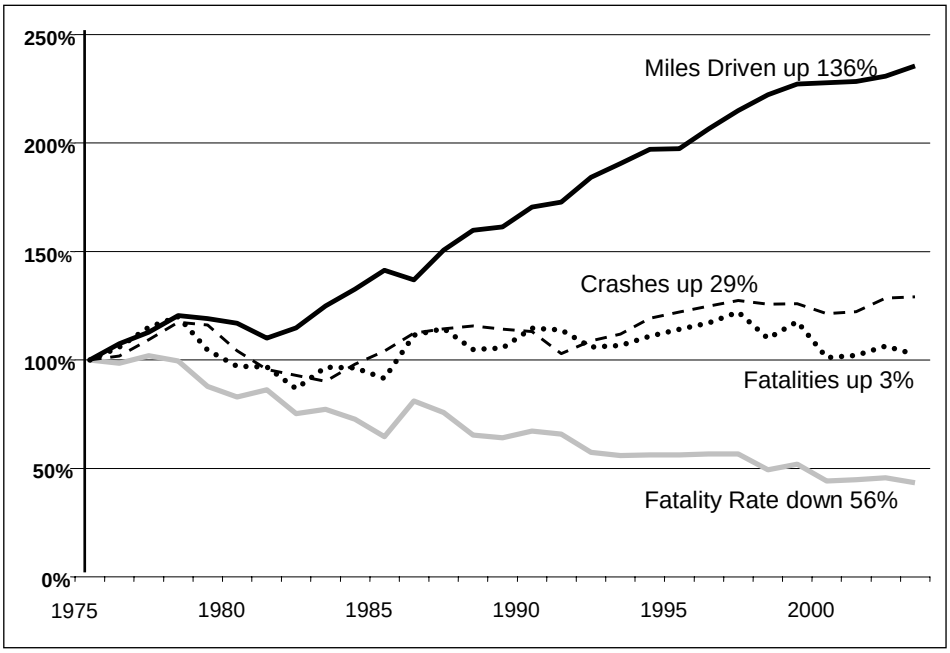

Figure 1-2: Alabama travel and crash changes since 1975.

- Rapidly Increasing Trend – One indicator has increased at a strong and consistent rate – miles driven. It is one of the strongest measures of mobility in Alabama. Amazingly, miles driven have more than doubled in the past 20 years. Alabamians are highly mobile, and other indicators show that this state is often in the top five in the nation in mobility (Bureau of Transportation Statistics, 2003).

Table 1-2: Changes in travel and crashes in Alabama since 1975

Indicator	1975	2003	Change
Miles Driven (Billions of Miles)	24.84	58.5	+ 136%
Injuries (Thousands of Injuries)	27.9	44.8	+ 61%
Fatalities	975	1001	+ 3%
Fatality Rate	3.93	1.71	- 56%

- Relatively Stable Trend – Crashes and fatalities belong in this category. Although both have fluctuated over time, fatalities are currently near their 1975 level and crashes have increased much less than one percent per year. This positive fact is undoubtedly due to the creation of highway safety programs, vehicle safety improvements, stronger legislation, the work of so many safety advocates, and other factors. If these programs had not been in place, the number of crashes and fatalities would have grown at the same rate as travel and would have been much higher in 2003.

- Declining Trend – The best fact in Figure 1-2 and Table 1-2 is that the fatality rate has steadily declined over this time period. In fact it is at an all time low at the current time. Again, the reason is that so many good safety programs are now in operation.

In summary, Alabamians drove more than twice as many miles in 2003 than they did two decades ago. This increase in mileage driven should have resulted in large increases in injuries and fatalities – but it did not. Preventing highway deaths from doubling in this time period is a tribute to all safety advocates. But at the same time, the sheer number of crashes and fatalities demand that those advocates work harder and do more to improve highway safety.

Project Planning And Organization

The broad study required for this project was open ended, so the steering team developed several guidelines for it. The first major decision was to use SMART (the Safety Management, Action and Resources Task Force) to guide the project. SMART is a volunteer group with more than 75 members from 25 stakeholder organizations and agencies. SMART meets four times per year at the call of the FHWA Alabama Division Administrator. Using the SMART group for this project ensured a comprehensive, multi-agency approach, with interdisciplinary expertise of true safety experts to provide resources during the development of the plan.

The second major decision was to use crash data as the basis for important decisions. Alabama is fortunate to have ready access to the CARE (Critical Analysis Reporting Environment) software developed by Dr. David Brown of the University of Alabama. CARE was initially created to process and report safety data, but has been expanded into a premier data-mining tool. It is used by 10 state highway agencies and countless smaller agencies. In this project, Dr. Brown used CARE to conduct real-time data analyses for SMART and its subgroups to guide decisions.

The third major decision was to create special interdisciplinary teams to investigate special topics during the project. The team members came principally from the SMART membership, supplemented by recruited "volunteers" with special expertise in unique topics.

Initial Meeting

The first general meeting of project participants was a SMART meeting on February 12, 2004, at the main office complex of ALDOT in Montgomery, Alabama. The meeting was attended by 46 individuals from 19 agencies and organizations. The objectives of the meeting were to provide an overview of traffic crashes in Alabama, to introduce participants to the AASHTO safety plan, and to call for volunteers to participate in the Alabama implementation efforts. The Comprehensive Highway Safety Plan (CHSP) was discussed in depth, and the steps for implementation were introduced. At that point, SMART members adopted a specific goal for the CHSP:

> *THE GOAL OF THIS PLAN IS TO DECREASE THE FATAL MILEAGE RATE IN ALABAMA FROM **1.8** TO **1.5** PER 100 MILLION VEHICLE MILES TRAVELLED BY 2008.*

The Lead State initiative was addressed next. Typical Run-Off-Road (ROR) data was reviewed and strategies for diminishing these crashes were discussed. The following goal was introduced and unanimously approved by SMART members:

> *THE GOALS FOR THE LEAD STATE INITIATIVE ARE TO REDUCE RUN-OFF-ROAD FATALITIES FROM **416** TO **357** AND RUN-OFF-ROAD INJURIES FROM **8230** TO **7068** BY 2008.*

Prior to adjourning, SMART members committed to staffing the volunteer teams, and to meeting on a general schedule of once per month. Activities would be carried out through phone, fax and email between meetings. Finally, all participants agreed that SMART would meet periodically to review progress and to offer suggestions for improvements and new directions, as needed, to the plan preparation process.

Second Meeting

Following the initial meeting, the steering team established a general structure that encouraged volunteer participation, while making it easy to communicate both horizontally and vertically. High-ranking managers were involved to obtain their early commitment and to keep them aware of the study. For each team of volunteers, one member of the steering team served as the facilitator and resource person. The general arrangement is shown in Table 1-3.

The second project meeting was conducted in March 2004 in the central office complex of ALDOT in Montgomery. The meeting started with an overview of the AASHTO Strategic Highway Safety Plan, a brief review of progress on the Alabama implementation effort, a discussion of remaining work, and a review of immediate objectives. Then meeting participants split into the two primary work teams (CHSP and ROR) for the remainder of the meeting.

The ROR team reviewed crash data to define the scope of the problem in Alabama so that they could begin identifying emphasis areas within the ROR topic. UTCA researchers overviewed NCHRP Report 500, Volume 6 *A Guide for Addressing Run-Off-Road Collisions*, concentrating on the roadside clear zone concept and countermeasures for off-road crashes.

The CHSP team spent a lengthy period studying crash data and crash trends. The crash information presented earlier in this report is illustrative of the materials that they analyzed. Dr. Brown developed much of this information in real time during the session, using the CARE software. Table 1-4 is an example. In effect, it summarizes the factors that contributed to fatal crashes in 2003. The CARE IMPACT module used data mining techniques to evaluate particular factors in the table, tracing their causes and effects. With this type of analysis, it was possible for team members to select the emphasis areas for the CHSP. The team concluded that four of the first six factors in the table (restraint not used, speeding, alcohol/drug use, and young drivers) were related because they symbolized risk taking, and concluded that "Risky Driving" was an obvious choice for the first emphasis area.

Table 1-3: [1]Initial project organization and staffing plan

Operations Manager – Waymon Benifield, ALDOT Multimodal Bureau, Safety Section
Facilitators/Resource persons – Dan Turner and David Brown, University of Alabama

Executive Team
Mr. Joe Wilkerson, Division Administrator FHWA
Mr. Joe McInnes, Transportation Secretary, ALDOT
Col. W.M. Coppage, Commander, Alabama Department of Public Safety (DPS)
Mr. John D. Harrison, Director, Alabama Department of Economic & Community Affairs (ADECA)

Project Steering Team
ALDOT: Waymon Benifield and Wes Elrod
FHWA: Linda Guin
UTCA: David Brown, Dan Turner, Brett Wood and Kerri Keith

Management Team – SMART Task Force

CHSP TEAM **(Waymon Benifield as Point Person)**
ALDOT Transportation Planning Bureau
ALDOT Design Bureau
ALDOT Maintenance Bureau
ALDOT Division Engineer
ADECA – Law Enforcement /Traffic Safety Section
DPS
Federal Motor Carrier Safety Administration
Administrative Office of Courts
Department of Public Health (DPH), EMS Unit
Metropolitan Planning Agencies
Children's Hospital
National Highway Traffic Safety Administration
Auburn University, LTAP program

ROR TEAM **(David Brown as Point Person)**
ALDOT County Roads Bureau
ALDOT Design Bureau
ALDOT Maintenance Bureau
ALDOT Multimodal Bureau (Safety)
ALDOT Construction Bureau
ALDOT Public Relations Bureau
ADECA – LETS
DPH
DPS
County Engineer
City Engineer
Sheriff
Alfa Insurance
University of Montevallo, Traffic Safety Center

Additional Resource Persons
Alabama Beverage Control Board
Alabama Department of Education
Emergency Management Administration
Alabama Trucking Association
Mothers Against Drunk Driving
Operation Lifesaver
State Safety Coordinating Committee

[1]As the project evolved, additional teams were added to address the five specific emphasis areas of the CHSP. See chapters 2-6 of this report for listings of those teams.

Based upon similar analyses of crash data, the team identified additional emphasis areas and produced the following list:

- Emergency Medical Services (the third factor shown in Table 1-4)
- Restricted Drivers (factors four and eight from Table 1-4)
- Legislation
- Risky Driving (factors one, two, four and six from Table 1-4)
- Run-Off-Road (based upon very high fatality rates for this type of crash)

Table 1-4: Summary of crash severity by top 20 crash types – 2003 Alabama data

	Fatal Crashes	Fatal %	Injury Crashes	Injury %	PDO Crashes	PDO %	Total Crashes
1. Restraint not used	449	3.1%	5,685	39.2%	8,376	57.7%	14,510
2. Speeding	276	3.7%	3,164	42.7%	3,971	53.6%	7,411
3. EMS: ambulance > 20 minutes	223	3.3%	5,046	79.2%	1,196	17.5%	6,825
4. Alcohol/drug	192	2.6%	2,984	39.6%	4,366	57.9%	7,542
5. Obstacle removal	155	1.9%	2,905	35.8%	5,052	62.3%	8,112
6. Youth: age 16-20	152	0.5%	6,842	23.7%	21,889	75.8%	28,883
7. License status deficient	98	1.7%	1,846	32.2%	3,792	66.1%	5,736
8. Mature: age > 64	78	0.7%	2,824	23.4%	9,173	7.8%	12,075
9.Ped, bike, school bus	75	5.5%	863	63.2%	428	70.9%	1,366
10. Pedestrian	68	9.9%	563	82.3%	53	31.2%	684
11. Fail to conform: stop/yield sign	56	0.7%	2,420	28.5%	6,023	81.5%	8,499
12. Motorcycle	46	4.0%	748	64.8%	360	63.7%	1,154
13. Non-pickup truck involved	41	0.7%	1,011	17.7%	4,648	81.4%	5,700
14. Utility pole	30	1.3%	834	35.0%	1,518	63.7%	2,382
15. Roadway defects – all	28	0.8%	939	25.8%	2,675	75.4%	3,642
16. Vehicle defects – all	26	0.8%	738	22.9%	2,466	76.4%	3,230
17. Fail to conform: signal	24	0.3%	3,023	31.5%	6,545	68.2%	9,592
18. Construction zone	20	0.7%	650	21.2%	2,398	78.2%	3,068
19. Vision obscured: environment	15	0.8%	529	27.4%	1,389	71.9%	1,933
20. Child not restrained	12	0.9%	767	54.1%	638	45.0%	1,417

Subsequent Developments

Following the second meeting, the steering team identified SMART members and other subject matter experts to staff four of the Emphasis Area teams. The fifth team, ROR, had already been staffed because it was one of the two major thrusts of the ALDOT project.

Each team conducted its own meetings over the next five months. The general process was to review crash data, analyze it, establish emphasis area goals (where applicable), and establish a plan that would diminish the overall contribution of the emphasis area to crash fatalities in Alabama. This would help the state reach its primary goal of decreasing the fatal mileage rate in Alabama 1.5 per 100 million vehicle miles traveled by 2008.

The following chapters in this report outline the research steps to develop the individual highway safety plans for each of the five emphasis areas. After completion of work by the individual emphasis area teams and approval by SMART, the individual components were merged into the Comprehensive Highway Safety Plan for Alabama.

In preparing these materials, the emphasis area teams based their decisions, to the extent feasible, on crash data and known history of countermeasure applications in Alabama. At the same time they recognized that NCHRP currently has many safety research projects underway, and remained open to new analysis procedures and new countermeasures. As a result, the five plans in this document are open ended and allow the implementing groups to optimize the results during the selection of countermeasures.

The steering committee stressed that prioritization decisions should be made using the best information available. This starts with knowledge of the current crash history of the particular crash type that is being addressed, and an estimate of how much the particular countermeasure project will affect this crash history. The cost of the countermeasure is also quite critical, since funds expended on one project cannot be expended on alternative projects. For a complete discussion of methods for optimization, prioritization and evaluation, see Appendix B.

References

Bureau of Transportation Statistics, US Department of Transportation, http://www.bts.gov/ accessed August 10, 2004

CHAPTER 2
EMS COMPONENT

Problem Statement

History

The concept of EMS evolved after the Vietnam War, where survivability was greatly improved by decreasing the time between the onset of trauma and the delivery of military patients to treatment. Following the war individual states developed EMS programs, but in different styles and with varying rates of success. Consequently, there was not a uniform national pattern for EMS organizations, policies, responsibilities or funding sources.

The Trauma Care Systems Planning and Development Act of 1990 (Roberts, 2003) was a major improvement in the situation. The purpose of the Act was to create and manage a system to give patients access to the most appropriate trauma care. Even though funding provided by the Act amounted to only about $2.5 million per year nationwide, it was a good start. Since then, there has been a clear movement to improve trauma care on several fronts. Agencies and professional organizations have stepped forward to create national standards and "best practice" protocols. For example, "Resources for the Optimal Care of the Injured Patient," was published by the American College of Surgeons in 1998. (ACS, 1998) It provided national guidelines for trauma care, and earned the nickname of "the gold book." Another initiative was the creation of the "National Trauma Data Bank" by the ACS to collect data on each event that occurs from the trauma through the end of medical treatment. To date, there has been little research into pre-hospital treatment, but over time the Data Bank will allow very detailed studies and development of improved EMS processes, protocols and treatments.

Alabama Situation

The Alabama situation has mirrored the national picture. There are currently 187 EMS service providers in Alabama utilizing about 850 vehicles, with approximately 12,000 EM technicians and drivers certified at present. Unofficial estimates indicate that only 8,000-9,000 are employed full time, with about a 10 percent shortage in EMT personnel.

Formerly, there was a system of regional EMS agencies across the state. Their primary activities were planning and continuing education, but they also identified funding for equipment for providers. Administration of the funding for the regional agencies was shifted to another agency, and it gradually eroded. This removed the important elements of coordination and education of EMS units, making is more difficult for smaller EMS units (usually composed of volunteers) to stay up to date and to adequate meet their mission.

The many local EMS units vary widely in type and capability from location to location. Efforts are underway on multiple fronts to enhance them. For example, the ADECA Annual Highway Safety Plan and the Alabama Department of Public Health (ADPH) strategic plan include action items to reduce EMS response times. ADPH has adopted its own protocols, developed by the

State Emergency Medical Committee (ADHP, 2002). Example protocols related to EMS are shown in Table 2-1.

Table 2-1: Sample protocols for Alabama EMS

PURPOSE: The purpose of this protocol is to delineate the scene time limitations.

PROCEDURE:

1. If at any time an EMT cannot provide or protect a patient airway within 5 minutes after patient encounter and initiating emergency medical care, she/he is required to transport the patient immediately.
2. If, at any time an EMT predicts that she/he will be on the scene or has been on the scene for 30 minutes after patient encounter and initiating emergency medical care, he/she is required to contact the on-line medical direction hospital.
   - A. Communicate pertinent patient history.
   - B. Communicate treatment given.
   - C. Ask whether patient should be transported immediately or other care should be given.
   - D. Anticipate answering the question: "What further can be done?"
3. For cases involving significant trauma, time spent on the scene should be ten (10) minutes or less where extrication has been accomplished and the patient can be moved away from the site.

Source: Alabama ALS Protocols, 2002

The Special Situation of Rural EMS

The availability, quality of service, and timeliness of emergency response units have a major impact on the survival of citizens involved in motor vehicle crashes. The distances between major population centers in Alabama create extensive suburban and rural regions, which have distinctly different trauma response patterns for vehicle crashes. In rural areas more time is spent locating, stabilizing, and transporting vehicle crash trauma victims, reducing their chances of survival. This pattern has been recognized by national experts, as shown by the following statements:

- Rural local road systems have a death rate three times greater than the Interstate System, and the care victims receive after a crash is one of the four major factors contributing to rural road fatalities. "Care of crash victims also contributes to rural fatalities because of the additional time needed to provide medical attention and the quality of rural trauma care. The nature of rural areas makes it difficult to provide adequate emergency medical care." (GAO, 2004)

- Responses to crashes in rural areas are likely to be slower, due to factors like remoteness, lesser quality roadways, and process complications in providing timely, quality health care. (Roberts, 2003)

- Only one-fourth of the geographical area of the U.S. is not served by trauma care systems. (Centers for Disease Control, 2002)

- Optimal acute trauma care could have saved up to 35 percent of vehicular trauma patient deaths. (Centers for Disease Control, 2000)

There are several steps between the occurrence of a rural crash and the eventual arrival of the patient at a hospital. The differences in urban and rural response times for each step are illustrated in Table 2-2. Even though the data in the table is several years old, the same general trends still hold. The rural times for individual steps averaged 35 to 90 percent longer than their urban counterparts, and the overall time from crash to hospital arrival averaged about 45 percent longer for rural crashes.

Table 2-2: Average 1998 EMS response times[1]

Time (minutes) between major events	Rural	Unknown	Urban	Unknown
Crash until EMS notification	6.77	37%	3.62	46%
EMS notification until EMS arrival at scene	11.36	3%	6.26	47%
EMS arrival at scene until hospital arrival	36.28	67%	26.63	72%
Crash until hospital arrival[2]	51.78	68%	35.46	71%

[1] NHTSA, 1999
[2] Not a total of the top three categories; separate records are kept for this category.

ALDOT compared the Alabama situation to the national picture by using EMS response data taken from Alabama Uniform Traffic Accident Reports for 2003 traffic crashes. This data indicated that 223 deaths occurred when EMS response units required more than 20 minutes to reach crash locations. EMS response times exceeding 20 minutes were reported in a total of 5,608 injury and fatality crashes statewide. Furthermore, 52% of theses crashes occurred in only twelve Alabama counties. These were some of the most populous counties of the State, implying that suburban settings may contribute to the problem more than initially suspected. The crash data used by ALDOT to review and analyze EMS arrival times was not sufficient to reconstruct the events from the initial notice to EMS until the time a crash victim was released from a health care unit. Other sources of data must be identified and utilized to obtain a more detailed understanding of the overall problem.

EMS Review Team

A committee was formed to examine EMS contributions to traffic safety in the state, particularly the relationship of EMS response time to the fatal and injury crash problem. Those participating on this team had diverse backgrounds, and were very familiar with the traffic crash data system, EMS data, and EMS response processes. Among those participants were the following:

- EMS Division, Alabama Department of Public Health (DPH), two representatives
- Injury Prevention Division, DPH, two representatives
- Law Enforcement/Traffic Safety Section, Alabama Department of Economic and Community Affairs (LETS, ADECA)
- Southeast Alabama Medical Center
- Highway Patrol Unit, Alabama Department of Public Safety (DPS)
- Multimodal Transportation Bureau, Safety Section, ALDOT, two representatives

Several meetings were held to discuss EMS programs and processes, to learn more about the traffic crash problem and the EMS data system, and to identify the relationship of its various components to highway safety. The committee discussed a wide variety of response issues and data, looking for ways to improve EMS response times and trying to answer difficult questions like the following:

- How much must the average response time be reduced to significantly affect survival of traffic crash victims?
- What level of coverage is needed to provide access to the desired level of trauma care?

- How many units are needed to adequately cover a particular geographical region?
- What types of response and transport vehicles are needed?
- Where should units be located to provide reasonable coverage?
- What level of training is appropriate? (individuals certified as Advanced Level providers are allowed to perform many procedures that Basic Level providers are not allowed to perform.)
- What is the total cost of providing the desired level of coverage?
- Where do funds come from for vehicles, equipment, supplies, operations, training, etc.?

One of the compounding factors was the relative scarcity of research in pre-hospital EMS activities, but this also made it clear that data must be gathered and evaluated as the basis for the most cost effective expenditure of resources on EMS. At length, the team developed a consensus to focus on five important issues for further development and inclusion in a work plan. These five topics can form the basis for priority decisions and continual improvement in EMS actions.

Work Plan

1. IDENTIFY AND ANALYZE PERFORMANCE DATA – There are several studies underway throughout the State, collecting trauma treatment and care data from highway crashes. Studies are underway at the DPH for the Patient Care Report System; federal funding through NHTSA is supporting a study at the Center for Rural Vehicular Trauma at the University of South Alabama; and federal funding through FHWA is supporting a study related to crash notifications at the Center for Injury Sciences at UAB. Other studies may also be underway related to trauma care for crash victims. These studies offer great opportunities to examine the EMS performance data for highway crash victims requiring trauma care.

   Recommendations
   1. Select a knowledgeable firm or health care group to review and evaluate the studies, data, etc., to develop a cost efficient statewide system to reduce the EMS response times and improve the quality of trauma care.
   2. Develop a process for correlating the EMS data with the ALDOT crash data system to provide a mechanism to help identify projects for funding.

   Funding
   Use funds from ALDOT, ADECA, and any other available funding sources.

   Agencies Involved
   DPH should be the lead agency because of the involved EMS data bases. ADECA, DPS, and ALDOT should be support agencies in this effort.

2. FIRST RESPONDERS – Improve the ability of first responders, who are often law enforcement officials, to care for trauma victims at the crash site as a way to reduce response times. This will require adequate training and equipment for responders and transporting vehicles for victims.

Recommendations

1. Provide training and equipment for law enforcement officers who respond to crash sites, so that they can perform basic trauma techniques.
2. Upgrade the training and equipment for Volunteer Fire and Rescue Squads, and provide the resources to enhance response to trauma needs at crash sites including the ability to transport victims.
3. Develop a "best practices" manual for use by EMS units operating in various locations (urban, suburban and rural).

Funding

Use any funds available through ADECA, ALDOT, DPH, or DPS to implement these recommendations.

Agencies Involved

DPS and DPH should collaborate on training for law enforcement officers.

Representatives from the DPH, various EMS professional associations, and others should develop a partnership to recommend enhancements for training and equipping Volunteer Fire and Rescue Squads and develop a "best practices" manual.

3. IDENTIFY CRASH LOCATION – Using currently available technology, develop a plan to improve the ability to locate crash victims on the State's highway network. The Global Positioning System (GPS) has the potential to locate crash sites quickly and accurately that should reduce EMS response times. This technology is readily available and is currently being used for a number of public and private entities in Alabama.

Recommendations

The implementation of GPS technology statewide would increase the accuracy for pinpointing crash locations and assist EMS responders by reducing response times. Coordinates for identifying crash events would assist ALDOT, DPS, and DPH in their tasks to improve safety on the State's highways. This would be a major factor in the effort to improve safety in Alabama. This process should be integrated with crash records, EMS databases, law enforcement records, etc. to enhance the data analysis systems.

Funding

GPS units should be made available to law enforcement units, EMS units, and others involved in providing emergency services. Funding should be through ALDOT, ADECA, or other agencies.

Agencies Involved

ALDOT should work with DPS, ADECA, DPH, and local governments to develop a systemic plan for utilizing GPS technology.

4. STATEWIDE ASSESSMENT AND PLAN – The number and type of EMS units and responders operating across the State are varied and diverse in their approach and ability to provide emergency response for crash victims requiring trauma care. The ability to respond and the quality of care may vary from area to area.

   Recommendations
   A review should be made of response times and trauma care of EMS units operating throughout the State. Emergency health care interests should work with various associations, State and local agencies, insurance companies, and others to identify needs, reduce response times for EMS and establish metrics for quality of care for trauma crash victims. This type of effort could be used to identify needs and support legislation to provide equity in all phases of the EMS response program on a state wide basis.

   Funding
   Consider funding through ADECA, ALDOT and private sources to reduce response times and improve the quality of trauma care for crash victims.

   Agencies Involved
   Oversight would be provided by DPH with assistance from other agencies as needed.

5. IMPROVE EMS RURAL ACCESS – There are a number of areas in the State that do not have reasonable access to EMS responders, particularly in rural areas. This increases the response time for emergency services to reach a crash site and provide trauma care. A program to reduce the access time in such locations could increase the survival rate among crash trauma victims.

   Recommendations
   1. Review the geographical distribution of EMS providers throughout the State and develop a strategic plan to improve statewide coverage and reduce EMS response times.
   2. Develop maps, websites, and literature to increase the public awareness of EMS issues and needs. Partnerships with public and private resources should be included in this effort.

   Funding
   Consider funding through ADECA, ALDOT, and DPH to develop appropriate maps. Consider EMS outreach programs.

   Agencies Involved
   DPH should be the lead agency because of its expertise and experience in these areas.

Implementation Plan

There is no indication at this time that specific funding that will be available to accomplish the tasks in this work plan. The pending status of the reauthorization of federal surface transportation programs, the possibility of a specific requirement for a comprehensive highway safety plan in the reauthorization, and the available funding will determine the direction and extent of the implementation efforts.

In the absence of this information, the implementation plan will be developed in stages or phases with priority given to those elements that appear to be reasonable to accomplish within the financial restraints and resources of the various agencies participating in the preparation of this plan. For initial purposes, the total effort has been categorized as (SR), median-range (MR), and long-range (LR) strategies and efforts. The short-range category should take one year or less, median-range one to two years and long-range three years or more. These phases and priorities may change as further information is received or developed. The proposed priorities and the lead agencies are listed in Table 2-3.

Table 2-3: Time frame for implementation of the EMS work plan

Work Plan Reference	Priority short, median, long - range	Lead Agency
1.1	LR	ADECA, DPH, ALDOT
1.2	LR	ADECA, DPH, ALDOT
2.1	SR (or MR)	DPS, DPH, Private
2.2	MR	DPH, Private, etc.
2.3	SR	DPH, Private
3	LR	ALDOT
4	SR	DPH, ADECA
5.1	LR	DPH
5.2	SR	DPH, ADECA, ALDOT

Evaluation

As each specific work plan item is developed, a detailed evaluation plan will be developed by the EMS team and included as part of the project output.

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CHAPTER 3
LEGISLATIVE COMPONENT

Problem Statement

As part of Alabama's initiative to reduce the statewide fatality rate, many of the key actions of the Comprehensive Highway Safety Plan will require legislative action. Legislation will be needed to provide funding for individual programs and permanent support for enforcement and other traffic safety related issues. In some instances, enabling legislation will be needed to permit actions to proceed. Other legislation will continue and enhance existing programs.

At one time, State Senator Pat Vacca chaired a legislatively-created group called the Sate Safety Coordinating Committee (SSCC). As long as the Senator chaired it, SSCC was a powerful force for traffic safety issues. He was adept at forming safety coalitions and one-on-one sessions with his peers, always for the sake of improving safety. But with the passing of the Senator and increasing demands on state agency managers, SSCC slowly lost its clout. Currently there is not an active group or organization that provides comprehensive review and tracking of Alabama legislation across a broad front, and which keeps traffic safety individuals and agencies informed on how legislation affects highway safety. Efforts are splintered with various agencies or groups' independently submitting or monitoring legislation pertinent to their own interests. As a result legislative activity was designated as one of the five key action areas for the immediate future, and a work team was created to develop the Legislative component of Alabama's Comprehensive Highway Safety Plan.

Legislative Work Team

Representatives of the following agencies and organizations were appointed to the work team. As word of the CHPS spread through the safety community, additional individuals volunteered for the team and were appointed. The following list indicates the wide appeal of the issue:

- Governor's Office, Deputy Legal Advisor
- Alabama Department of Economics and Community Affairs
- Alabama Department of Public Health
- Alabama Department of Public Safety
- Alabama Department of Transportation, Multimodal Bureau (Safety)
- Alabama SAFE KIDS/Southeastern Child Safety Institute
- Alabama Trucking Association
- Children's Hospital
- Institute of Transportation Engineers, Alabama Section
- State Safety Coordinating Committee
- Montgomery Highway Safety Office (2 representatives)
- West Alabama Highway Safety Office (2 representatives)
- VOICES for Alabama's Children, Coordinator of Policy and Programs/Kids Count Director

The primary goal of the team was to develop a plan for a permanent organization (committee, task force, team, etc.) that would identify, review, monitor and propose legislation pertinent to highway safety initiatives which will aid in the reduction and severity of crashes on Alabama's roadways. It would develop strategies to inform policy makers and the general public of safety issues and seek the passage of legislation to remedy issues.

A secondary goal of the team was to identify highway safety issues that could be addressed by the Alabama Legislature to reduce the number of annual traffic crashes, fatalities and injuries. Additionally, the team was to identify any legislation that affected federal cash flow into the state (i.e., incentive laws, or laws that limited or curtailed use of federal funding unless Alabama adopted specified legislation).

The Legislative Team met multiple times over six months, and continuously corresponded via email and telephone. Many of the team members who track legislation for their own organizations or agencies were very helpful in preparing this plan element. After a draft list of potential legislation had been prepared, the team reviewed and polished it before final approval.

Two sources of information that were very helpful during preparation of the plan are located at the end of this report. Appendix C contains a listing of legislative recommendations prepared by the National Transportation Safety Board for Alabama. Appendix D contains Alabama Code that created the SSCC, which might be helpful if new legislation is desired to create a group to monitor and encourage safety legislation.

Legislation Work Plan

The work plan consists of two principle items. The first of these is a list of potential legislation that should be investigated for adoption in Alabama. The second is creation of a designated group to identify, track, and otherwise facilitate adoption of such legislation on a continuing basis.

Creation of a Permanent Legislation Group

The team felt that a thorough study should be performed to determine how other states handle legislative activities, and that an Alabama group (called "task force" for the remainder of this discussion) be created through a new law. The task force should be adequately funded, and one individual should be charged with ensuring the success of the group at performing its task. The task force should be comprised of individuals and representatives of various groups and agencies that (1) have a working knowledge of traffic safety issues, (2) have the resources to allocate funds for the implementation of safety initiatives, and (3) the knowledge and ability to pursue the enactment of laws designed to promote the improvement of traffic safety.

The primary goal of the task force will be to identify, review, monitor and propose legislation pertinent to highway safety initiatives which will aid in the reduction and severity of crashes on Alabama's roadways. The objective of the task force will be to develop strategies to inform policy makers and general public of safety issues and seek the passage of legislation to remedy issues.

Identification of Potentially Desirable Legislation

Strengthen the Graduated Drivers License (GDL) Law – Four changes are proposed:

- Provision 2: 30-50 hrs supervised driving in learner stage
- Provision 3: Nighttime restriction in intermediate stage
- Provision 4: Passenger restriction in intermediate stage
- Amend to add restriction for "older driver" (FUNCTIONALLY IMPAIRED TASK TEAM)

Booster Seat Law – Require for children ages 4-8 and weighing 40-80 pounds

Statewide Red Light Camera Law – Needed to allow localities to operate red light running photo enforcement programs.

Child Restraint Law (No Gaps) - A state is considered not to have gaps in its child restraint laws if all occupants under the age of 16 are covered by either a child restraint law or a safety belt law.

Unattended Children Law - A person responsible for a child who is 8 years of age or younger shall not leave that child in a motor vehicle without being supervised in the motor vehicle by a person who is at least 14 years of age.

Aggressive Driving - Prohibit acts of aggressive driving (including excessive speeding, tailgating, unsafe lane changes, failing to yield right of way, ignoring traffic control devices, etc)

Cell phones - Prohibit use of wireless communication devises while driving

Review Enforcement Of Interstates By Municipalities Since DPS Staff Is Limited - Allow the enforcement of Interstates by local law enforcement municipalities

Review Distribution Of Funds On Citations Issued - Provide for local law enforcement agencies (i.e. Sheriffs) to obtain funds from citations issued.

School Bus Occupant Protection - Require that all vehicles carrying more than 10 passengers (buses) and transporting children to and from school related activities meet the school bus structural standards.

Primary Seatbelt Law for all Passengers - Require all passengers to wear safety restraints.

ATV - Restrict the use of All Terrain Vehicles by under-aged children.

Restrict Passengers in Rear of Pickup - Allow passengers to ride only in seating areas equipped with safety belts.

Increase the Threshold Amount of Damages required for Reporting Crashes - Crashes with fatalities, injuries or property damage in excess of $500 requires reporting.

Identification of Legislation that Affects Federal Funding to Alabama

Section 410 Impaired Driving - Funding to Alabama is now limited because the adopted Graduated Drivers License law did not contain certain provisions recommended by NHTSA.

Legislation Recommended by Other Task Teams

Max Alcohol Violations - Adopt ordinances which close businesses after 3 violations, (RISK TAKING TASK TEAM)

Underage Alcohol Violations – Adopt stronger penalties for any underage alcohol conviction (RISK TAKING TASK TEAM)

Discourage DUI - Color coded tags for violators and those convicted of DUI, (RISK TAKING TASK TEAM)

Distinguish Underage Individuals - Color code /change of drivers' licenses to denote under age 21 (RISK TAKING TASK TEAM)

Diminished Driving Skills – Require vision, cognitive, and physical testing (FUNCTIONALLY IMPAIRED TASK TEAM)

Physician Reporting – Require physicians to report certain impairment (FUNCTIONALLY IMPAIRED TASK TEAM)

License restrictions – Mandate license restrictions for certain health conditions (FUNCTIONALLY IMPAIRED TASK TEAM)

Age Related Driving Restrictions - Revise licensing renewal time frame (FUNCTIONALLY IMPAIRED TASK TEAM)

Older Driver Designation - Universal symbol on vehicle to identify older driver (FUNCTIONALLY IMPAIRED TASK TEAM)

Implementation Plan

This plan element will require a concerted effort to define what is needed, to circulate the plan widely and build consensus, and to identify a method to have it adopted. It is not possible to identify that method at this point in the planning because of the inherent nature of politics and adoption of legislation. But it is possible to develop a general list of actions that are needed for creation of the task force and for long term, continuous adoption of desirable highway safety legislation:

- Identify legislators, lobbyists and special interest groups that are interested in traffic safety.

- Identify existing legislation to use as a model.
- Identify those laws that are resulting in loss of funds and focus on them.
- Identify or develop procedures which have proven to be effective.
- Identify legislation which has the greatest probability of enactment.
- Review proposed legislation to determine if it will adequately address the issues.

Evaluation Plan

An assessment of traffic data will be preformed to analyze crashes and citations annually and as needed for special needs (legislation). The assessment will identify areas which could be addressed through Legislation. Additionally, legislative suggestions will be obtained through sister states and professional organizations (see Appendix C). It will be reviewed for improvements to the Alabama Code.

Recognizing that only a limited number of safety bills will be passed by any session of the Legislature, potential legislation can be prioritized through (but not limited to) the following processes:

- Review by SMART Committee.
- Review of the current political climate for passage.
- Review funding obtained or lost with or without passage.
- Identification of sponsor(s) of legislation.
- Coalition support.

In addition, the standing legislative work team created by execution of this plan element will recognize that political conditions will arise when unexpected bills come to the floor. The team will assess these bills and take appropriate action (i.e., discourage those with questionable safety benefits and support those with strong benefits.

Finally, a before and after analysis can be conducted after new legislation has been in place long enough to affect traffic safety. This will be the most accurate way to evaluate the effectiveness of the Legislative Team's actions.

CHAPTER 4
RESTRICTED DRIVER COMPONENT

Problem Statement

The American driving population is becoming older, and many members of this group experience some form of limitation that could affect driving skills. "Mature driver" was the eighth most prevalent factor associated with Alabama fatal traffic crashes in 2003 (Table 1-1). The reason why older drivers are getting more attention from transportation professionals is illustrated in Figure 4-1. They are the fastest growing segment of the American population, and will expand by about 50 percent in the next 15 years and will double in the next 25 years. The sheer speed at which this age group is increasing is enough reason to include it in this comprehensive highway safety plan; however, there is a second, even more persuasive reason.

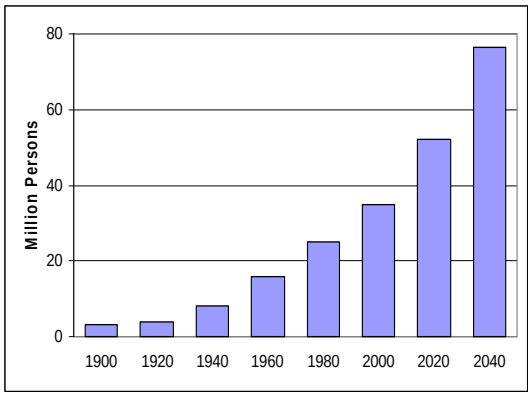

Figure 4-1: Projected growth in US population over age 65

Mature drivers become more likely to be involved in a fatal crash once they reach age 65 (see Figure 4-2). Once they reach the age of 75 their odds of being involved in a fatal crash increase at an alarming rate. The combination of rapid age-group expansion plus increasing crash tendency implies that there will be many, many more severe crashes among mature drivers unless some action is taken to address this issue.

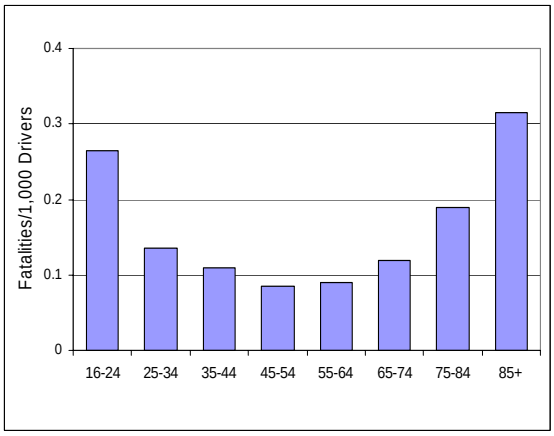

Figure 4-2: Driver age vs. fatalities per thousand drivers
(based on Cerrelli, 1998)

Some insight into the causes of the increased crash rate may be found in Table 4-1, which shows that angle collisions are highly overrepresented in fatal crashes among older drivers. This implies that older drivers have trouble seeing drivers approaching from the side or from slightly behind them. Examples of common physical factors involved in these crashes are: (1) a limitation in neck movement that prevents older drivers from turning their heads far enough to see vehicles approaching from the side, and (2) deteriorating peripheral vision that prevents older drivers from seeing vehicles approaching from the side). These are just two of many possible explanations for the age-related increase in crashes identified in Table 4-1.

Table 4-1: Angle collision fatalities by age[1]

Age Range	Percent
16 – 24	24
25 – 34	27
35 – 44	27
45 – 54	28
55 – 64	31
65 – 74	38
75 – 84	49
85+	56

[1] NHTSA, 1997

A deeper examination of the factors associated with physical restrictions like those discussed in the previous paragraph leads to two important conclusions. First, the limitations are not solely a function of age. Second, Alabama has not embraced or addressed the issue of drivers with deteriorating skills, or the effect that this issue has on traffic safety, as outlined in the next several paragraphs.

The current state licensing renewal requirements do not include physical, cognitive, or visual screening, or testing. This is important because standard traffic control devices are not designed to adequately accommodate restricted drivers.

In addition, law enforcement officials are not trained to identify casual drivers as cognitively, physically, or visually impaired. The driver condition block on the current Alabama Uniform Traffic Accident Report does not include an option to identify a driver as cognitively, physically, or visually impaired. Without the ability to identify or track these drivers, it is currently not possible to quantify the impact they have on fatalities and injuries in Alabama. Likewise, physicians and optometrists are not trained or strongly encouraged to identify patients as visually impaired for drivers licensing purposes. Neither are doctors trained or strongly encouraged to identify patients as cognitively or physically impaired for drivers licensing purposes.

Restricted Driver Definition

For this report, a restricted driver is defined as a motor vehicle operator who is cognitively, physically, or visually impaired and whose ability to drive as safely as the average driver is subsequently reduced.

- A cognitive impairment is one that would affect a driver's ability to judge speed and distance, such as making a left-turn maneuver in front of oncoming traffic.

- A physical impairment is one that would affect a driver's ability to physically operate a vehicle, such as a neck injury that might prevent a complete range of movement, preventing a driver from looking back over the left shoulder at an acute intersection, or a severe diabetic who might be at risk of having blackouts.

- A visual impairment is one that would affect a driver's ability to see well enough to make good decisions regarding the driving environment, such as stopping at a red traffic signal or stop sign, keeping the vehicle between the lane lines, reading signs, or simply avoiding other vehicles or a pedestrian in a crosswalk.

Restricted Driver Team

A team was formed of SMART representatives and additional experts in the restricted driver issue. The membership was intended to represent the different perspectives within Alabama regarding drivers who have or may develop physical, cognitive, or visual impairments. The agencies and organizations represented include the following:

- Alabama Department of Public Safety
- Alabama Department of Economic and Community Affairs
- ALDOT, Multimodal Bureau, Safety Section
- ALDOT, Maintenance Bureau, State Traffic Engineer
- Alabama Department of Senior Services
- Alabama Optometric Association
- City of Montgomery, Traffic Engineer
- Eye Clinic of Prattville
- Federal Highway Administration, Alabama Division
- Montgomery County Department of Human Resources

The team met several times to discuss the restricted driver issue in general and to develop a draft work plan. One of the first tasks the committee tackled was the development of the restricted driver definition and problem statement. The topic name was problematic, as it evolved from "Older Driver" to "Functional Impairment" and finally to "Restricted Driver." Almost immediately, the team recognized this issue was not age dependent. As drivers become older, their visual, cognitive, and physical capabilities degrade, but this happens at a different pace for each individual. In addition, a "younger" driver may have an illness or accident which causes loss of ability as well. The team, therefore, concluded the restricted driver issue was not age dependent.

The team also concluded restricted driver issues and countermeasures fall into three broad categories: roadway, driver, and legislation. The team focused on developing specific recommendations within these broad categories.

Work Plan

1. ROADWAY COUNTERMEASURES – Standard traffic control measures, such as signing, marking, and traffic signals provide positive guidance to all motor vehicle operators. Enhanced traffic control measures may mitigate some of the problems restricted drivers must overcome. ALDOT and some local agencies are implementing many of these enhanced traffic control measures already.

   Recommendations:
   Hire a university (or consultant familiar with these issues) to develop an educational program for ALDOT and city and county engineers so they will recognize the benefits of enhanced traffic control measures and incorporate them into their standard practices. Suggested measures to include are listed below. The university/consultant should not restrict their evaluation to these suggestions.

   a. Enhanced Signing – ALDOT and Local Agencies Lead
      (1) Advance street name signs
      (2) LED street signs
      (3) Oversized signs and legends

   b. Signal Head Modifications – ALDOT and Local Agencies lead
      (1) Back plates on signal heads
      (2) LED signal heads

   c. Markings and Delineation – ALDOT and Local Agencies lead
      (1) Rumble striping – centerline and shoulder
      (2) 6” striping
      (3) Rumble strips

2. DRIVER COUNTERMEASURES – Motor vehicle operators with visual, physical, or cognitive impairments may take measures to compensate for their impairment if they are made aware of it. Optometrists and medical doctors can play a big role in making impaired drivers aware of their driving limitations or in educating them regarding potential options to mitigate their impairment.

   Recommendations:
   a. Public Education – Hire a university/consultant to evaluate the benefits and cost to develop an educational program to address the restricted driver issue. Suggested measures to evaluate are listed below. The university/consultant should not restrict their evaluation to these activities. One task for this study would be to identify funding sources and lead agencies/organizations. Private organizations should be considered for funding and leading.

(1) Public service announcements to educate the public at large regarding what defines a restricted driver, and to publicize the availability of help for restricted drivers.
(2) Appearances by guest experts on "At Your Service" and other PBS shows to educate the public regarding the issue of restricted drivers.
(3) Educational mail-outs by automobile insurance companies.
(4) Awareness classes tied to lower auto insurance rates.
(5) Modification of the Alabama Drivers Manual to explain physical, cognitive and visual impairments.

b. Doctor Intervention - Hire a university/consultant to develop an educational program for doctors so they will recognize restricted drivers and understand the reporting mechanism. Suggested measures to evaluate are listed below. The university/consultant should not restrict their evaluation to these activities. One task for this study would be to identify funding sources and lead agencies/organizations. Private organizations should be considered for funding and leading.

(1) Sponsor a workshop to educate doctors regarding identification and reporting methods for physical, cognitive, and visual impairment.
(2) Develop a form for doctors to give to patients for delivery to auto insurance companies that will provide a discount on insurance for providing documentation that they have no visual, cognitive, or physical impairment
(3) Develop an evaluation and reporting system for doctors, optometrists and other appropriate caregivers, to provide feedback to restricted drivers, as well as the AL Department of Public Safety, regarding their ability to drive safely.

c. Provide alternative transportation – Loss of mobility or fear of that loss is a significant factor related to this issue. A successful restricted driver program must address this concern by providing an adequate, but not necessarily equal substitute. Hire a university/consultant to study transit programs within Alabama, as well as other systems in the U.S. The university/consultant would also study the demand for alternative transportation that would be generated by implementing a restricted driver program. Use the findings of this study to develop a program to accommodate restricted drivers, using the existing transit system as a cornerstone. Suggested components of the study are listed below. The university/consultant should not restrict their evaluation to these activities. One task for this study would be to identify funding sources and lead agencies/organizations. Private organizations should be considered for funding and leading.

(1) Expand rural transportation system and/or supplement taxi cost
(2) Educate potential riders about the availability of the rural transportation system

(3) Restricted driver "sticker" – develop a voluntary program that allows a restricted driver to apply a sticker to their vehicle identifying them as a restricted driver, with the hope other drivers would be more patient around them and perhaps give them a wider berth than without the sticker. Work with insurance companies to translate the use of the sticker into savings on auto insurance for the restricted driver.

3. Legislation – Alabama does not require any type of visual, physical or cognitive screening or testing for driver licensing renewal.

   Recommendations:
   Incorporate visual, physical, and cognitive elements into Alabama's driver's license renewal process - Hire a university/consultant to research existing documentation regarding requirements for renewal drivers licensing in the U.S. and abroad. Use this research to develop recommendations for modifying renewal drivers licensing in Alabama. Based on information from the publication *Older Americans Report*, July 16, 2004 edition, Maryland has a very progressive older driver program that may provide excellent guidance for the restricted driver program AL wishes to create. The National Highway Traffic Safety Administration (NHTSA) studied the Maryland effort and subsequently published a three volume guide titled the *Model Driver Screening and Evaluation Program*, which recommends restricting licenses rather than revoking them in many instances. These are valuable resources that should be used in the AL effort.

   Suggested Evaluation Milestones
   a. Visual – at ages 20/45/65
   b. Physical – to be determined
   c. Cognitive – to be determined

Implementation Plan

Implementation of this program is dependent upon funding the recommendations. ALDOT and ADECA are the primary State agencies with money to fund these types of programs. The value of implementing restricted driver programs must be evaluated in terms of fatalities and injuries prevented in order for ALDOT and ADECA to determine how best to spend their limited funds.

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CHAPTER 5
RISKY DRIVING ISSUES COMPONENT

Problem Statement

Several analyses were performed to focus on the most pressing issues facing the traffic safety community. For example, the subjects of DUI, speeding and other violations, failure to use restraints, and several other issues were analyzed. The findings showed a strong correlation in demographics between these various issues. That is, there was no single cause that could be isolated. The same individuals who were driving while intoxicated were also generally speeding, not wearing restraints and committing other violations. In addition, they demonstrated risky behavior through actions like driving late at night on weekends, in bad weather and at high speed on county roads. They tended to be young males, and those who engaged in one risky behavior were found to also engage in most, if not all, of the other risky driving behaviors.

This characteristic has been noted by several NHTSA studies and has been recognized for some time. For example, "The primary safety issues related to drivers between the ages of 15 and 24 are inexperience, immaturity, and risk taking." (NHTSA,1993). For this reason the CHSP Team decided to consolidate all of these issues into a single category that could be dealt with simultaneously by a number of countermeasures. This was termed the "Risky Driving" category. Risky behavior is in fact a byproduct of inexperience and immaturity, so these two driver characteristics are included in the Risky Driving category of this plan.

Table 5-1 defines *risky driving* more specifically using police officers' opinions of "Primary Contributing Circumstance" on the crash report form. Table 5-1 lists this information for calendar year 2003 (CY2003), ordered by frequency of occurrence. To prepare the table, all "primary contributing circumstances" variables (from the crash report form) were evaluated, and those that were clearly related to risky driving were listed in the table. This is a conservative list because some of the excluded contributing circumstances could certainly involve some level of risk on the part of the driver, and also because pedestrian crashes were excluded. Even so, the categories that were clearly indicative of risky driving contributed over 60% of the total crashes and almost 72% of the fatal crashes. In other words, risky driving was a major contributor to serious crashes in Alabama in 2003.

Risky Driving Work Team

A "Risky Driving Team" was formed as a subcommittee of SMART. Care was taken to ensure that group participants represented a wide range of expertise and interests. Many interested individuals served on this team, representing the following agencies and groups:

- ADECA/Law Enforcement Traffic Safety Division
- University of Montevallo Traffic Safety Center,
- Alabama Department of Transportation,
- Community Traffic Safety Programs (CTSPs),
- Federal Highway Administration,
- Mothers Against Drunk Driving

- Alabama Beverage Control Board
- Alabama Department of Public Safety
- ALFA Insurance, and
- The University of Alabama (UTCA).

Table 5-1: Definition of risky driving by circumstances contributing to crashes

Primary Contributing Circumstance	CY 2003 Frequency of Crashes	Percent of Alabama Crashes	Percent Crashes Related to Risky Driving	Percent Fatal Crashes Related to Risky Driving
Fail To Yield Row	22,192	15.73	15.73	11.35
Driver Not In Control	18,676	13.24	13.24	13.35
Following Too Close	13,763	9.76	9.76	0.11
Fail To Heed Sign Or Signal	7,003	4.96	4.96	4.56
Improper Lane Change Or Use	4,840	3.43	3.43	1.00
Improper Driving For Environment	4,786	3.39	3.39	3.45
Dui	4,339	3.08	3.08	12.46
Over Speed Limit	3,300	2.34	2.34	15.57
Improper Turn - U-Turn	2,289	1.62	1.62	0.33
Wrong Side Of Road	1,850	1.31	1.31	6.90
Improper Passing	1705	1.21	1.21	2.45
Improper Turn - No Signal	89	0.06	0.06	0.00
Non-Risky Behavior Categories	56,235	39.87	0.00	0.00
Totals =	141,067	100	60.13	71.53

The initial organizational meeting was held on May 20, 2004. It consisted of a review of Alabama crash statistics and trends, followed by discussions and analyses of how to significantly reduce the fatal crash rate. A brainstorming session was conducted to define and quantify key risky driving issues, and to suggest countermeasures. All of the suggested countermeasures were tabulated and distributed in the minutes to that meeting. The relevant portions of the ADECA Highway Safety Plan were also distributed to provide a baseline for future planning efforts. This led to a second meeting of the team, which was conducted via a phone conference on June 23, 2004, where additional countermeasure action items were suggested. This produced a re-organization and consolidation of the list of countermeasures that led to a draft of the current report. This draft was circulated several times to get all team member's input before it was presented to the team in another meeting and finalized in its present form.

Work Plan

The Risky Driving team selected four issues as the most important for action to reduce risky driving in Alabama:

- Alcohol/Drugs
- Occupant Protection
- Police Traffic Services
- Youth-Targeted Programs

Note that the first of these is a root cause of crashes, while the second two are countermeasure-oriented. The last of these is an appropriate target, since youth have been clearly demonstrated to be most heavily involved in risky driving behavior.

The following sections of the plan include brief summaries of each issue and countermeasures recommended to address each issue. Additional discussions and more detailed recommendations are given in Appendix E.

Goals for Each Risky Driving Issue

The following goals for the Risky Driving element of the CHSP were excerpted from short-term goals of the ADECA/LETS Highway Safety Plan, which also contains long-term goals and strategies, comparable to many of the countermeasures recommended below. They are subdivided into the major areas that should be impacted by the various risky-driver countermeasures.

Alcohol/Drugs

- Reduce the number of reported alcohol-involved fatal and injury collisions by 2% from the 2003 base reporting year total of 3,177 to 3,113 or less by end of reporting year 2004.
- Reduce the percentage of fatalities that are alcohol-involved from the reporting year 2003 base value of 24.9% to 23.9% or less by end of reporting year 2004.
- Reduce the percentage of injuries that are alcohol-involved from the reporting year 2003 base value of 10.8% to 9.8% or less by end of reporting year 2004.

Youth-Alcohol

- Reduce the number of reported under-21 years of age (causal driver) alcohol/drugs involved crashes from 1179 in reporting year 2003 to below 1139 by end of reporting year 2004.
- Reduce the number of reported under-21 years of age (causal driver) alcohol/drugs involved fatal and injury collisions from the 2003 base reporting year total of 436 to 432 or less by end of reporting year 2004.

Occupant Protection

- Reduce the number of reported fatalities and injuries for vehicle occupants under four years of age from the reporting year 2003 base year total of 734 to 572 injuries and fatalities by end of reporting year 2004.
- Increase safety belt compliance from 77.4% in 2003 to 86% by the end of reporting year 2004.
- Increase child safety seat compliance from 87% in 2003 to 92% by the end of reporting year 2004.

Police Traffic Services

- Reduce the total fatal and injury collisions from the reporting year 2003 base year total of 31,691 to 30,567 or less by end of reporting year 2004.
- Reduce the number of reported speed-related crashes from 7,413 in reporting year 2003 to fewer than 6,987 by the end of reporting year 2004.
- Reduce the number of reported speed-related fatal and injury collisions from the reporting year 2003 base year total of 3,441 to 3,362 or less by end of reporting year 2004.

Planned Actions for Each Risky Driving Issue

Alcohol/Drugs Action Items

No other single causal entity can be tied to as many fatalities as the use of alcohol/drugs while driving. Approximately 40% of fatalities are caused by alcohol/drugs. Planned action items follow.

- In close coordination with SMART, activate the Governor's Task Force against Drinking and Driving, and charge it with formulating optimal countermeasures that do not make unrealistic demands on agencies charged with implementation.
- Develop and implement a statewide alcohol Public Information & Education campaign.
- Coordinate and facilitate a statewide DUI workshop.
- Develop local alcohol safety plans and councils to formulate problem-solving strategies and to transfer alcohol crash countermeasure technology.
- Provide education to school age children in grades K-12 on alcohol awareness as part of a comprehensive program of traffic safety.
- Provide uniform training in the Standardized Field Sobriety Test Battery (SFSTB), Breath Alcohol Screening Devices (BASD) to adhere to changes in Alabama's Traffic Laws (Act 96-324), which requires consistent calibration.
- Expand the dispenser awareness program into a mandatory training course.
- Expand statewide the program to coordinate college personnel and activities and teen alcohol outreach peer counseling.

Occupant Protection Action Items

Restraint systems have been demonstrated and recognized for decades to be one of the most effective countermeasures for reducing the severity of crashes. However, they do no good if they are not used, and failing to use them is clearly risky behavior. The following activities are planned in this area:

- Continue the promotional and educational campaigns to reinforce the importance of safety belt usage and serve as a strong reminder of the Alabama Primary Safety Belt Law.
- Increase police emphasis on restraint enforcement.
- Coordinate the activities of the nine regional highway safety coordinators, the Alabama Department of Public Health, the Alabama Department of Public Safety, local law

enforcement agencies, governmental agencies and other organizations to promote the Click It or Ticket safety belt campaign during major holidays.
- Expand the Click It or Ticket campaign efforts to be an ongoing, yearlong program.
- Conduct area briefings, establish partnerships, employ the media, conduct training, and perform rigorous law enforcement of the state's occupant protection laws.
- Provide educational programs and technical assistance (brochures, advertising campaign, and other informational materials) throughout the state.
- Develop special programs to concentrate on groups that exhibit low safety belt and child restraint usage.
- Conduct standardized Child Protection System (CPS) training as well as CPS checks and clinics, and increase the size of the trained personnel pool qualified to conduct CPS clinics and training throughout the state.
- Provide a comprehensive educational program designed to heighten community awareness, provide CPS information, train and certify CPS technicians and establish car seat checking stations.

Police Traffic Services Action Items

Police Traffic Services countermeasures include all traffic enforcement efforts as well as the various publicity efforts that are facilitated by State and local police departments. Countermeasures under consideration follow.

- Enforce Alabama's Primary Safety Belt Law by means of Selective Traffic Enforcement Programs (STEPs), which are implemented in conjunction with educational campaigns (PI&E).
- Purchase video equipment to support police STEP efforts.
- Promote the use of the Law Enforcement Tactical System (LETS) at check-stops.
- Provide funding for overtime for all STEP and check-stop activities through the Community Traffic Safety Programs (CTSPs).
- Implement a special overtime effort to conduct a statewide rural STEP project aimed at identified segments of roadway with high crashes, including D.U.I. enforcement, safety belt and child seat enforcement as well as strict enforcement of posted maximum speed limits, including public information and education efforts.

Youth-Targeted Action Items

The term "youth" refers to two age groups: 16-20 year old drivers for non-alcohol related risk taking, and 19-23 year old drivers in alcohol related risk taking. The rationale for these target age groups is given in Appendix E of this report. Planned action items follow.

- Develop and implement an "early education" program starting in the grade schools and providing reinforcement over a 10-15 year period.
- Develop a second component, aimed at parents, of the program defined in the "early education" bullet above.
- Establish a mechanism to promote alcohol free events for colleges.

- Promote education on traffic safety and alcohol use at college orientation or through some type of freshman class.
- Work with universities to develop and incorporate messages on their web sites or through e-mail.

Setting Priorities

The establishment of priorities among countermeasures within the risky driving category is problematic because of the great interaction among the various proposed countermeasures. In addition, several funding sources might be applied from agencies with entirely different purviews. Rather than prioritizing specific countermeasures, the team recommends considering the potential to reduce the various crash types from Table 1-1 (presented in the Chapter 1 of this document). Table 5-2 extracts those crash types that are related to risky driving.

Table 5-2. Crash severity by crash type for risky driving crash types

Crash Type (Causal Driver)	Fatal Number	Fatal %	Injury Number	Injury %	PDO No.	PDO %	Total
1. Restraint Not Used*	449	3.09%	5,685	39.18%	8,376	57.73%	14,510
2. Speeding	276	3.72%	3,164	42.69%	3,971	53.58%	7,411
4. Alcohol/Drug	192	2.55%	2,984	39.57%	4,366	57.89%	7,542
6. Youth -- Age 16-20	152	0.53%	6,842	23.69%	21,889	75.79%	28,883
11. Fail to Conform to S/Y Sign	56	0.66%	2,420	28.47%	6,023	70.87%	8,499
17. Fail To Conform to Signal	24	0.25%	3,023	31.52%	6,545	68.23%	9,592
20. Child Not Restrained*	12	0.85%	767	54.13%	638	45.02%	1,417

* Person count as opposed to crash count for “fatal number” category.

This indicates that, all other things being equal, there are higher potentials for reduction in the restraints, speeding, alcohol/drug and youth areas than in the remaining categories, which are significantly lower in potential. However, all other things are not equal. In applying these numbers to prioritize countermeasures, the following must be considered:

- Neither these categories nor the countermeasures that are proposed to address them are mutually exclusive. For example, a crash might simultaneously involve speeding, alcohol and an unrestrained driver of age 16. Similarly, a selective enforcement effort might consider alcohol, speeding and restraints simultaneously.
- The effectiveness of the countermeasure is as important in determining priorities as the potential that this effectiveness will impact. For example, a countermeasure with 20 percent impact on the speeding category would have to be given a higher priority than a 10 percent impact on the restraint-not-used category.
- Given that considerable recent efforts have been made to increase restraint usage in Alabama, the marginal effect of applying resources to this topic might not return benefits as large as they did immediately after the passage of the mandatory usage law. On the other hand, the recent gains will most surely be lost unless the effort is maintained to some degree.

- In many cases categorical funding, federal agency guidelines, and regional programs dictate overall countermeasure strategy. In these cases, information should be generated and applied to assure that the most effective tactics are applied in carrying these strategies out.

The procedure for performing cost-effectiveness studies discussed above should be applied when it is clear that a particular budget needs to be allocated among a variety of countermeasures, and should always be applied when working out the specific tactics of implementation (who, what, where, when and how). In those cases of multi-agency investments, it would be wise to assemble a multi-disciplinary oversight group to provide overall project guidance. Such a group can also be of great use in resolving priorities where there is no documented history of new or innovative programs. Additional information on prioritizing projects may be found in Appendix B of this report.

Responsible Agencies

For each safety work task, a lead agency should be assigned to implement the effort. This ensures that someone is charged with designing, scheduling, and implementing the safety initiative. To the extent possible, appropriate agencies have been identified as part of this study. They may be found in the more-comprehensive discussion of Risky Driving action items found in Appendix E.

Funding

The funding picture for the proposed programs will not be entirely clear until the US Congress passes legislation to reauthorize USDOT surface transportation programs (over a year overdue at the time this report was published). However, several agencies and organizations will have obvious responsibilities. The following are among them:

- The ADECA/Law Enforcement Traffic Safety Division (ADECA) will receive its traditional allotment of funds from the National Highway Transportation Safety Administration, and would be expected to be a major leader in funding these projects. The ADECA/LETS detailed plan for implementing most of these countermeasures may be found on the CARE web site (http://care.cs.ua.edu).
- The Alabama Department of Transportation (ALDOT) has received special funding in recent years to apply to driver countermeasures. It has worked in close coordination with ADECA on the allocation of these funds.
- The Alabama Department of Health has developed a strategic plan that includes several of the countermeasures mentioned above.
- The Alabama Beverage Control Board provides funding for enforcement and education with regard to underage drinking.
- The Alabama Department of Public Safety provides ongoing resources for enforcement and education.
- Volunteer organizations, such as MADD, SADD, etc. contribute both financial and personnel resources in advancing and advocating the particular aspects of traffic safety that fall within their charters.

- Private companies, such as insurance and trucking companies, invest in research and educational efforts.

Implementation Plan

Each of the organizations listed above has a specific implementation plan for allocating those funds available to it for traffic safety. It is imperative that these organizations and state agencies keep abreast of other efforts being made in parallel to their agencies so that there are no conflicts or non-productive overlaps. Modifications of agency activities should be performed when research findings or other evaluations indicate that such modifications are warranted. The following implementation plan is recommended once this overall strategic plan is adopted by SMART:

- Retain the current SMART Risky Driving Team as a Risky Driving Project Steering Committee, as an active overseer of the projects that have been recommended; this will involve all of the agencies indicated above. This Steering Committee will perform the following functions.
    - Hold monthly progress checks in which each of the proposed countermeasures is reviewed and reports are made to the Steering Committee to assure that projects are either underway or are being implemented on a prioritized basis.
    - Document those areas in which projects are lagging, and contact the responsible agency heads to determine if the Steering Committee can be of assistance.
    - Provide a continuous communication function to assure that all activities in the various agencies are coordinated and mutually supportive.
    - Perform an annual evaluation to assure that that the plan is being followed and that it is also periodically improved as new information becomes available and as new issues arise.

References

NHTSA, 1993: Addressing the Safety Issues Related to Younger and Older Drivers; A report to Congress," Office of Program Development and Evaluation, Traffic Safety Programs, January 19, 1993.

CHAPTER 6
LANE DEPARTURE COMPONENT

Problem Statement

There are two different types of lane departure crashes. The first and most common type is when a single vehicle runs off the road (ROR) and crashes into a fixed obstacle or ditch, or overturns. These are very severe crashes with much higher than normal injury and fatality rates. The second type of lane departure crash occurs when a vehicle crosses the centerline of a two-lane road or the median of a divided highway, and causes a head-on crash. This portion of the CHSP will cover both types of crashes.

ROR Crashes

The SMART Task Force selected ROR crashes for further study based upon their high severity rates. This is illustrated by Figure 6-1, which shows that they are involved in 40 percent of all fatal crashes. However ROR causes only 15 percent of crashes so ROR is 2.67 times over-represented in fatal crashes (i.e., 40% fatal divided by 15% crashes). That implies that Alabama crash fatalities can not significantly lowered in Alabama unless off-road crashes are addressed.

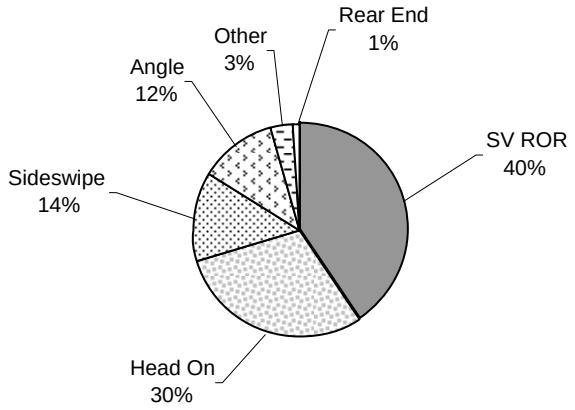
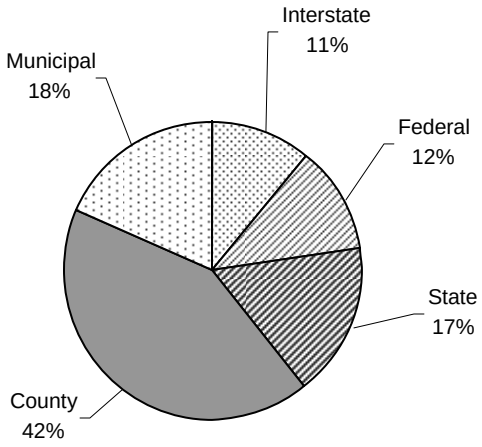


Figure 6-1: Types of fatal crashes

Figure 6-2 and Table 6-1 provide more definitive information. The figure shows the types of roads upon which these crashes occur. It is obvious that county roads are the leading contributor to fatal ROR crashes with 42 percent of the total. This is the type of information needed to develop a good safety program – it looks like a ROR safety effort dedicated to this one category of roads might treat half of all ROR fatalities. The figure also shows that Federal and state roads (these categories have similar design characteristics and both are under the jurisdiction of ALDOT) constitute another 29 percent of these crashes. This appears to be another good

candidate for a safety program. Two separate safety efforts are needed because county roads have much different characteristics from federal/state roads; this implies that the factors contributing to ROR crashes will be different on the two classes of road. Certainly the types of countermeasures used to reduce ROR crashes on county roads will be much different from federal-state roads.



The table shows what happens to these vehicles after they leave the roadway. The most frequent "first harmful event" is hitting a ditch, which occurs in 30 percent of fatal ROR crashes. Hitting a tree is the next most frequent, and the combination of these two types constitutes about half of all off-road crashes.

Figure 6-2: Fatal ROR crashes by highway type

Table 6-1:
First harmful event in ROR Crashes, 1994-2003

First Harmful Event	Crashes	Percent

Ditch	57,413	30%
Tree	37,018	19%
Utility Pole	16,114	8%
Overturned	14,620	8%
Side Slope	10,411	5%
Fence	9,646	5%
Guardrail	9,091	5%
Mailbox	8,898	5%
Culvert Headwall	6,838	4%
Non-breakaway Sign	6,650	3%
Curbing	5,616	3%
Breakaway Sign	3,704	2%
Other Fixed Object	2,498	1%
Non- Parked Vehicle	2,470	1%
Bridge Rail	2,413	1%
Totals =	193,400	100%

Lane Departure Across Centerline

The second type of crash occurs when a vehicle crosses the centerline. For example, some portions of Interstate highways have experienced situations when out-of-control vehicles "crossover" the median and hit oncoming vehicles. These can be very severe, violent collisions, and often are featured by TV news shows and newspaper articles. It is often difficult for a safety program to identify, locate and diagnose these types of crashes because the accident report form does not contain a specific variable for "median crossover" crashes. In other words, a computer scan of the data can only look at surrogate data items to try to find them. A review of paper copies of accident reports can effectively find them; however, reviewing almost 150,000 annual crash reports by hand is out of the question. Neither is it realistic to prevent these crashes by installing barriers in the medians of all Interstate highways in Alabama. There are too many miles and the cost would be prohibitive.

Crossover crashes on two-lane roads are usually of the head-on variety. These are random occurrences that might be caused by impairment, inattention, sleep deprivation, risky driving on the part of the vehicle operator, mechanical failure of the vehicle, or similar causes. The roadway may also contribute due to poor geometry, below minimum sight distance or similar factors. These types of crashes are also hard to single out using a digital database because there is not a unique data variable that identifies them.

Lane Departure Work Team

At the initial meeting of the SMART taskforce in February 2004, volunteers were solicited to form a work team to analyze lane departure crashes in the state. These volunteers and other individuals identified by the project steering team formed an interdisciplinary work team. As the study progressed, additional volunteers joined the effort. Members of the team are identified in the following list by agency or organization represented:

- Alabama Department of Public Safety (two representatives)

- Alabama Department of Economic & Community Affairs
- ALDOT County Road Bureau
- ALDOT Construction Bureau
- ALDOT Design Bureau
- ALDOT Maintenance Bureau
- ALDOT Multimodal Bureau (three representatives from Safety section)
- ALDOT Public Relations Bureau (two representatives)
- ALFA Insurance
- City of Montgomery Traffic Engineer
- Elmore County Engineering
- FHWA, Alabama Division
- Montgomery County Sheriff's Office
- University of Montevallo, Safety Center
- University Transportation Center for Alabama (two representatives)
- Wentworth Corporation

Work Plan Development

This team met six times over six months. Team members reviewed ROR crash statistics and trends in Alabama, learned about general countermeasures for ROR crashes (keep vehicle on the road, minimize chances of a crash if the vehicle leaves the road; and minimize severity if the off-road vehicle crashes). They discussed causative factors and potential countermeasures, and they divided the overall crash situation into a series of work tasks that could be accomplished to reduce the overall problem.

The work team's early analysis of data and study of the characteristics of ROR crashes in Alabama identified the five primary work topics shown below. They will be discussed individually in the next several pages of this report:

- County road ROR crash analysis;
- Interstate median crossover crashes;
- Rural two-lane state route ROR crashes;
- Two-lane state route head on crashes; and
- Changes to ALDOT policies and procedures to reduce ROR crashes.

Work Plan

1. COUNTY ROAD ROR CRASHES – County roads account for the largest segment of ROR fatal crashes, with about 40 percent of the annual total for the state. This made it the leading candidate for safety action.

County roads are much different from state and federal routes. In general, they are older and often started as dirt roads that were eventually "blacktopped" by county commissioners. Compared to state routes, county roads are likely to be narrower, carry lower traffic volumes, have thinner pavements, have narrower or no shoulders, have fewer traffic signs, and have

sharper curves and steeper grades. All of these factors contribute to crash potential, especially for ROR crashes.

The situation is confounded by the relatively low level of funding available to county engineers, and the scarcity of traffic and roadway data. Accident data is also less complete than for state routes, especially location data. It appears necessary to overcome these challenges before an effective crash reduction program could be designed and implemented.

Recommendations:

1. Select a representative county for a pilot study of traffic crashes. Conduct a study to determine the magnitude of the problem, and whether a manual study of the crashes could provide a better understanding of and a clearer solution to county road lane departure crashes. The following work steps are suggested for such a study:

- Determine the number of lane departure crashes as well as their locations;
- Analyze and categorize such crashes;
- Identify high crash locations;
- Meet with the county engineer and his staff to determine whether they can provide surrogate variables or approximations of desired road and traffic data;
- Map the locations of crash data and search for clusters;
- Determine whether potential countermeasures can be identified for the county road system; and
- Determine the cost effectiveness of potential countermeasures.

Funding

ALDOT is the appropriate agency to fund this study.

Agencies Involved

One or more county engineers, DPS, ALDOT (several bureaus should be represented, including County Roads, Design, Construction, and Multimodal/Safety Section), and others should be included on the study team.

2. INTERSTATE MEDIAN CROSSOVER CRASHES – This type of crash is similar to a ROR crash, except that the vehicle departs the travel lane to the left and crosses through the median. Since it involves collisions between vehicles traveling at high speeds in opposite directions, these crashes have high numbers of fatalities and severe injuries.

It is not easy to identify such crashes from digital data files, because the crash report form does not include a variable for crossover crashes. Crashes must be identified intuitively by looking for patterns or combinations of unique data values. For example, crossover crashes usually involve the front of one vehicle striking the front of another, with one of the vehicles indicated as traveling the “wrong way.”

In simplified form, a project could be conducted to determine the magnitude of the problem, and whether it was possible to quickly review data by computer to find sites that were having an abnormally high number of crossover crashes

Recommendations:

- Examine paper copies of crash reports to determine the number of Interstate crashes in which a vehicle crossed the median and struck a vehicle traveling in the opposite direction;
- Analyze and categorize such crashes;
- Identify locations where such crashes were over-represented;
- Determine whether the CARE software can identify such crashes with sufficient accuracy compared to the use of paper copy crash reports provided by the DPS; and
- Determine whether the CARE software could be used (periodically) to determine locations to investigate for potential safety treatment.

Funding
ALDOT is the appropriate agency to fund this study.

Agencies Involved
ALDOT (several bureaus, including Design, Maintenance, and Multimodal/Safety Section) and DPS are the primary agencies to conduct the project.

3. ROR CRASHES ON RURAL TWO-LANE STATE/FEDERAL ROUTES– About 29 percent of ROR fatal crashes occur on federal and state routes. Both road types are under the jurisdiction of ALDOT. As such, they are subject to an automated procedure that identifies sites for safety study. This methodology identifies the most appropriate countermeasures for each site, finds the cost effectiveness of each countermeasure at each site, and prioritizes improvements using the marginal utility procedure. It is an extensive and rigorous procedure that provides the best use possible for the limited amount of safety funding available.

ROR collision sites are rarely identified for treatment through the automated procedure. This is because the most cost effective safety treatments involve multiple collisions at a single site (i.e., a cluster of crashes). In other words, one treatment can address many crashes and produce substantial safety benefits. Because ROR crashes are more likely to be single events at multiple locations, they do not compete well against crash clusters for limited funding.

Recommendations:

- Determine whether two-lane, state/federal route ROR overrepresentations can be identified by a computer analysis for a given road section by looking for a “dense distribution” of crashes rather than a cluster at a given site;
- Determine the most appropriate screening parameters to identify and categorize such dense distributions (i.e., two ROR fatal crashes in a two-mile section, or perhaps four ROR injury + fatal crashes in a three mile section, or …);
- Determine appropriate countermeasures for dense distributions;
- Determine whether the CARE software can identify such crashes with sufficient accuracy compared to the paper copy crash reports provided by the DPS; and
- Determine whether the CARE software could be used (periodically) to determine locations to investigate for potential safety treatment.

Funding
ALDOT is the appropriate agency to fund this study.

Agencies Involved
ALDOT (Design Bureau, Construction Bureau Maintenance Bureau, and Multimodal Bureau Safety Section) and the DPS are the primary agencies to address this recommendation.

4. TWO-LANE RURAL HEAD-ON CRASHES – About 30 percent of fatal traffic collisions in Alabama involve head on crashes. In rural locations on high-level roads (state and federal routes), these are likely to be high speed, severe crashes. Similar to ROR crashes, they tend to occur in dispersed locations rather than in clusters. This means that they do not compete well for safety funding in ALDOT's automated procedure.

These crashes involve lane departure to the left, similar to Interstate median crossover crashes. It seems possible that the findings of the Interstate median crossover study can be applied to two-lane head on crashes.

Recommendations:

- Determine whether the procedure developed to identify two-lane, state/federal route ROR crash over-representations is applicable for two-lane, state/federal route head-on crashes;
- Determine the most appropriate screening parameters to identify and categorize such dense distributions;
- Determine appropriate countermeasures for dense distributions;
- Determine whether the CARE software can identify such crashes with sufficient accuracy compared to the paper copy crash reports provided by the DPS; and
- Determine whether the CARE software could be used (periodically) to determine locations to investigate for potential safety treatment.

Funding
ALDOT is the appropriate agency to fund this study.

Agencies Involved
ALDOT (several bureaus should participate, including Design, Construction, Maintenance, and Multimodal/Safety Section) and the DPS are the primary agencies to address this recommendation.

5. CHANGES TO ALDOT POLICIES AND PROCEDURES – ALDOT has incorporated the roadside clear zone concept into its new designs to the extent that funding allows. This will help prevent many future off-road crashes and will minimize the severity of those crashes that do occur. However, there might be other areas of roadway design, construction, maintenance and

operation where existing policies could be revised to provide additional crash reduction without adding significant cost or time to projects.

Recommendations:

- Interview appropriate ALDOT managers involved in design, operation, maintenance, rehabilitation and similar activities to identify topics, policies and procedures that might be revised to decrease the possibility of off road crashes;
- Investigate whether possible policy and procedure improvements are cost effective and within existing budgetary restraints;
- Determine whether existing policies are based upon applicable national criteria, or whether ALDOT literature and computer programs might be upgraded to more recent versions to diminish off-road crashes;
- Determine whether any identified improvements might be applied to non-state routes (county roads, etc.).

Funding

ALDOT is the appropriate agency to fund this study.

Agencies Involved

Multiple ALDOT bureaus and the Alabama Division FHWA will be involved in the study.

Implementation Plan

The implementation of this CHSP element is already underway. ALDOT engaged UTCA to conduct both the CHSP project and the AASHTO "Lead State" project in late 2003. The Lead State project involved lane departures, so as SMART and the ROR work teams identified lane departure actions items (i.e., ROR studies, median cross over studies, two-lane head on studies, policy studies, etc.), UTCA organized and conducted them. The results of initial implementation efforts will be published in a UTCA final report and posted on the UTCA Web site (http://utca.eng.ua.edu/). It can be accessed by looking at the site "projects" page for project 04404.

CHAPTER 7
NEXT STEPS

This chapter will not be developed until feedback is gathered from SMART, agency heads and the project steering committee.

Appendices

A - Participants in Preparation of Comprehensive Highway Safety Plan
B - Safety Priorities, Optimization and Evaluation (Getting the Biggest Bang for your Safety Resource Investment)
C - 2004 Update Alabama Implementation of NTSB Highway Safety Recommendations
D - Pertinent Alabama Legislation
E - Elaboration of Risky Driving Characteristics and Recommended Countermeasures

APPENDIX A

Participants in Preparation of Comprehensive Highway Safety Plan

Preparation of this plan took approximately nine months, and involved nearly 100 stakeholders representing 34 federal, state and local agencies, safety organizations and individual safety advocates. Much of this time involved meetings, discussions and decisions by teams of safety experts during the plan preparation. The names of many of these participants were identified through meeting rosters, and are presented in Table A-1 on the next page. The table represents only a partial list, since meeting rosters were not prepared for all meetings.

The project steering committee expresses its deep gratitude to the individuals who participated in this process, whether included in the table or not. The extensive participation and deep commitment by individuals dedicated to improving traffic safety in Alabama is an example that others must follow to totally implement the plan to reach the goal of reducing Alabama's highway fatality rate by 20 percent.

Table A-1: Individuals and Organizations Participating in Comprehensive Highway Safety Plan

Vernon Barnett	Governor's Office	Legislate	Eric Marable	ALDOT, Safety	EMS
Mike Carroll	Admin Office of Courts	SMART	William Wallace	ALDOT, Safety	ROR
Jack Doane	Admin Office of Courts	CHSP	Pat Stringer	ALDOT, Safety	CHSP
Jan Byrne	ABC Board, Resp. Vendor	Risky	Sonya Baker	ALDOT, Safety	Risky
Nikki Steward	ABC Board, Enforcement	Risky	Ginger Johnson	ALFA Insurance	Risky
John D. Harrison	ADECA, Director	Exec	Kim Davis	ALFA Insurance	SMART
Rhonda Pines	ADECA, LETS	ROR	A. Buttenshaw	Ala Optometric Assn	Restrict
Carlos Kimbro	ADECA, Montgomery HSO	Risky	Janie Applegate	Alabama Safe Kids	CHSP
Kris McDowell	ADECA, Montgomery HSO	Legislate	Martin Spellicy	Ala Traffic Safety Center	SMART
Tasha Washington	ADECA, W AL HSO	Legislate	Freddie Ford	Ala Traffic Safety Center	ROR
Tom Barclay	ADECA, Mobile HSO	Risky	Gene Vonderaux	Ala Trucking Association	Risky
Maxie Thomas	ADECA, West Ala HSO	Legislate	Cathi Russell	Ala Trucking Association	Legislate
Chris Jowers	ADECA, LETS	Legislate	Brian Bowman	Auburn University	CHSP
J'Varra McCall	ADECA, LETS	Restrict	Bob Vecellio	Auburn University	ROR
Michael Bassett	Ala Dept Education	CHSP	John Moore	BellSouth	Risky
Joe Lightsey	Ala Dept Education	SMART	Suzanne Respess	Children's Hospital	Legislate
Earl Langley	ADPH, EMS	EMS	Bubba Bowden	City Montgomery DOT	Restrict
Melissa Khan	ADPH, Injury Prevention	EMS	Woody Johnson	City Montgomery DOT	SMART
Lynn Williams	ADPH, Injury Prevention	Legislate	David Griffin	City Tuscaloosa DOT	SMART
Jim Lewandowski	ADPH, EMS	EMS	Dan Thompson	City Tuscaloosa Police	SMART
John Campbell	ADPH, Trauma Task Force	EMS	Richie Beyer	Elmore Co., Co. Engineer	ROR
Col. W.M. Coppage	Ala DPS, Commander	Exec	Melissa Hoercher	Eye Clinic of Prattville	Restrict
Major C. Andrews	Ala DPS, Administration	Legislate	Joe Wilkerson	FHWA, Alabama Division	Exec.
Major P. Manning	Ala DPS, Highway Patrol	CHSP	Linda Guin	FHWA, Alabama Division	Steer
Capt H. Kearley	Ala DPS, Motor Carrier	CHSP	Kay Batey	FHWA, Alabama Division	SMART
Capt Danny Hall	Ala DPS, Highway Patrol	EMS	Lewis Harden	FHWA, Alabama Division	SMART
Lt Chris Williams	Ala DPS, Public Info	Risky	Jeff Dogan	FHWA, Alabama Division	Restrict
Capt. Hugh McCall	Ala DPS, Public Info	Risky	Karen Brooks	Fed Motor Carrier Safety	SMART
Lt Terry Chapman	Ala DPS, Driver License	Restrict	Judy VanLuchene	Fed Motor Carrier Safety	CHSP
Trooper D. Frazier	Ala DPS, Public Info	Risky	Dale Lenoir	Ala Institute of Trans Engrs	Legislate
Tina Hartley	Ala Dept Senior Services	Restrict	Bobby Murphy	Montgomery Co, HR	Restrict
Joe McInnes	ALDOT, Director	Exec	Lt Leigh Persky	Montg'ry Co, Sheriffs Office	ROR
Ronnie Poiroux	ALDOT, Division Engineer	CHSP	Peggy Batey	MADD - Alabama	Risky
Frank Courson	ALDOT, County Roads	ROR	Denise Hornbuckle	MPO/HSO, Birmingham	CHSP
Steve Walker	ALDOT, Design	ROR	Bill Kootsikas	NHTSA, Atlanta	SMART
Ron Newsome	ALDOT, Maintenance	ROR	Nancy Hudson	Operation Lifesaver	SMART
Tim Taylor	ALDOT, Maintenance	Restrict	Jackie Hammock	State Safety Coord Comm.	Legislate
George Ray	ALDOT, Trans Planning	CHSP	Jack Chancey,	SE Ala Medical Center	EMS
Norman Lumpkin	ALDOT, Public Relations	ROR	David Brown	University of Alabama	Steering
Linda Crockett	ALDOT, Public Relations	CHSP	Brett Wood	University of Alabama	ROR
Wes Elrod	ALDOT, Safety	Steering	Kerri Keith	University of Alabama	Risky
Waymon Benifield	ALDOT, Safety	Steering	Dan Turner	University of Alabama	Steering
Bill Luckerson	ALDOT, Safety	Restrict	A. Curtis-Hartsfield	Voices for AL Children	Legislate
LaShaundra Clay	ALDOT, Safety	ROR	Lenwood Herron	Wentwood Corporation	ROR
Ray Pugh	ALDOT, Safety	CHSP			

Acronyms And Abbreviations Used In This Table

ABC Board = Alabama Beverage Control Board
ADECA = Alabama Dept of Economics & Community Affairs
ADPH = Alabama Dept of Public Health
ALDOT = Alabama Dept of Transportation
CHSP = Comprehensive Highway Safety Plan Team
DPS = Alabama Department of Public Safety
DOT = Department of Transportation
Exec = Executive Team
EMS = Emergency Medical Services Team
FHWA = Federal Highway Administration
HR = Human Resources
HSO = Highway Safety Office
Legislate = Legislative Team
LETS = Law Enforcement/Traffic Safety
MPO = Metropolitan Planning Organization
MADD = Mothers Against Drunk Driving
NHTSA = National Highway Traffic Safety Administration
Resp. Vendor = Responsible Vendor/Alcohol Awareness Division
Restrict = Restricted Driver Team
Risky = Risky Driving Team
ROR = Run Off Road Crash Team
SMART = Safety Management, Action and Resources Task Force
Steering = Steering Team

APPENDIX B

Safety Priorities, Optimization and Evaluation

(*Getting the Biggest Bang for your Safety Resource Investment*)

With the possible exception of legislation, all countermeasures recommended in this plan require the allocation of limited resources. The ultimate authority for making these decisions rests with the agency head to which these resources have been allocated. In reality, usually individuals on the staff of the agency head will determine the best way for these resources to be allocated according to agency and funding program constraints. Typical constraints include:

- Total funds allocated, plus some of the constraints listed below that apply to the types of funds received (all funds cannot be used for all purposes even within a given agency);
- Personnel limitation constraints, usually dependent on the state personnel budget for that agency, but at times augmented with federal funds; and
- The specific traffic safety activities allowed by individual funding categories.

While all of the respective decision-makers in the various agencies will have to work together to reach an optimal and unified approach to traffic safety, it is recognized that each agency head maintains ultimate authority and responsibility to allocate the resources entrusted to him or her in a way that produces the maximum benefit for the roadway users of the State of Alabama. This balancing of allocations to a variety of countermeasures will be *optimal* if the allocated funds produce the maximum possible benefit (lives saved and suffering reduced).

Optimization and Prioritization

This section presents a plan for each of these decision makers (or their respective staffs) to use in performing allocations of resources to specific countermeasure projects and activities. In this regard, the first and most important element is the recognition that three factors are necessary for an optimal allocation of resources:

- An estimate of the total maximum gain that can be achieved in the type of crashes that can be affected by the countermeasure, in terms of crash frequency by severity;
- The impact that the countermeasure will have on this total maximum potential gain; and
- The cost of the countermeasure.

It is imperative to recognize that every countermeasure implementation has a downside, namely that the funds expended cannot be used for any other countermeasure. So knowledge of the three factors above does not guarantee optimization. However, ignorance of them will most certainly assure that the allocation will be deficient. The goal then becomes to fit all competing countermeasures into the budget in a way that maximizes the total benefit produced. Before going any further, these principles will be illustrated with simple examples.

Location improvement example A location had 20 crashes per year over the past three years, and an average of two per year involved cars hitting a particular tree. The maximum potential gain for removing the tree is two crashes per year, assuming that the removal of the tree will not expose vehicles to another hazard behind it. Other countermeasures might have additional

beneficial effects. For example, the addition of a guardrail might reduce severity although it will not reduce crash frequency.

Alcohol countermeasure example The number of alcohol crashes in the area that might be affected by a check stop averages about 100 crashes per year (of typical alcohol crash severity). It is estimated that the check stop can affect as many as 10% of these crashes.

In both of these cases the cost of the countermeasure is fairly easy to compute – this is usually provided to decision-makers as part of the funding proposal. Of the two other factors, the maximum potential impact is generally fairly easy to obtain from the Alabama CARE system. The most difficult factor, which of necessity must be estimated, is the impact. This might be estimated as either a reduction in frequency (independently of severity), or a reduction in severity (independently of frequency), or both. Consider the following general procedure for obtaining data on the required three factors for every countermeasure that is under consideration:

1. Carefully determine for each alternative countermeasure the crash type, location, age group, time to be applied, and any other factor that might limit its application.
2. Use CARE to create a filter and then determine the frequency and severity of all crashes that would qualify according to the restricting characteristics determined in Step 1. Obtain both the frequency and the severity of these crashes.
3. Estimate the percentage reduction due to the countermeasure. All severity classifications might not be affected in the same way (e.g., the total number of crashes might not change, but the number of injury crashes may decrease and the number of property-damage-only crashes might increase).
4. Calculate a benefit in terms of "equivalent injury crashes." First, convert the percentage reduction into crashes reduced by the countermeasure, by applying the estimated percentage reduction to the maximum potential crashes that can be reduced for each severity classification. Then convert the results to equivalent injury crashes by applying a common formula, for example:
    - 1 property-damage-only crash = 0.20 injury crashes
    - 1 injury crash = 1 injury crash
    - 1 fatal crash = 5 injury crashes

    Any consistent set of weighting factors can be applied, but recognize that past crash severities are being used to predict future crash severities. So the question that these weighting factors should answer is "to what extent does a property-damage-only (or fatal) crash predict a future injury crash?
5. Project this equivalent injury crash reduction over the effective life of the countermeasure (e.g., a roadway improvement might be effective for 15 years, while a check stop might only be effective for a few weeks after its implementation).
6. Estimate the cost of the countermeasure.

This should be done for every possible countermeasure under consideration, including various levels of any given countermeasure, if it is feasible to implement them at various funding levels. This will produce a measure of cost and a measure of benefit for each alternative countermeasure.

Optimization must consider all possible alternatives, since they are all competing against each other for funding. The simplest way to do this is to set up a table like that shown in Table B-1:

Table B-1: Example optimization of alternatives

Alternative Countermeasure	Cost	Benefit	Cost/Benefit
1.	$150,000	100	$1,500
2.	$300,000	150	$2,000
3.	$200,000	80	$2,500
Continue with list of alternatives	Etc.	Etc.	Etc.

The countermeasure descriptions have been omitted to remove implications with regard to real countermeasures. The alternatives are arranged in order of increasing cost/benefit. The units for cost/benefit are the cost in dollars to prevent one "equivalent injury" crash. Generally, optimization can be obtained by implementing countermeasures in the order of the lowest remaining cost/benefit until the budget (or other resources) is expended. Exceptions to this rule are possible when several lower cost projects further down the list can displace a larger cost project to increase the total benefit. Clearly the combination of alternative countermeasures that both fit within the budget and return the maximum total benefit is optimal. And correspondingly, the ordered list of countermeasures presents a priority ordering for implementation.

While the data might not always be available to perform the analyses detailed above, it is critical for decision-makers to understand the basic concepts of optimization if they are going to make the best decisions while allocating the resources under their control.

Tactical Optimization

The process described above is called strategic optimization. The analysis was conducted at the general project level, and little consideration was given at that point to the details of implementation. Once a decision is made to include a particular project in the allocation, additional steps should be taken to assure that the project is implemented in the best possible ways. Information can be generated from CARE to support the following types of tactical decisions:

- To whom should the project be directed? Information can be extracted from CARE on age, gender, race, vehicle age and geographic demographics to identify the best target situations or groups.
- What specifically should the project consist of? This is typically developed in fairly specific terms before it is approved for implementation. However, a CARE IMPACT analysis of all of crash variables, ordered by most significant first, will assist in answering many of the questions regarding the details of implementation.
- Where? Answer this question using information from CARE on county, city, and (perhaps for some countermeasures) roadway classification, urban/rural, intersection/segment, and in the most detailed case, specific locations for the crash type of concern.

- When? Use information from CARE on time of day, day of the week (and cross-tabulate these variables), and other variables such as lightning conditions to help answer this question.
- How and why did the crashes occur? These questions give further insight to support countermeasure development. They can best be obtained by a CARE IMPACT analysis over all variables, with further drilldowns into subsets using the automated filter generator from cross-tabulations.

In summary, as many decisions as possible should be based upon information derived from crash data. Fortunately for safety officials in Alabama, this capability is at the disposal of decision-makers via CARE.

Evaluation

Evaluation by its nature must take place after the countermeasure project is implemented. However, no effective evaluation can take place unless the groundwork is laid for it during the planning for the project. Administrative evaluations can be conducted to assure that the project was implemented at least to the specifications given in the proposal. Effectiveness evaluations can be performed to determine the impact that the countermeasure had on the crash history for the specific types of crashes that are being treated. These evaluations are greatly facilitated by the pre-project analyses that lead up to strategic and tactical optimization (as presented above). Effectively, by repeating these analyses after the project is completed, it is possible to determine if the goals of the project were met. Also, the evaluation can assess strengths and weaknesses of this particular project as a way to conduct more effective future projects.

APPENDIX C

2004 Update - Alabama Implementation of NTSB Highway Safety Recommendations

Subject	Ref.	Recommended Text	Status of Implementation
Child Passenger Safety	H-96-014	Review existing laws and enact legislation, if needed, to ensure that children up to 8 years old are required by the state's mandatory child restraint use law to use child restraint systems and booster seats.	Alabama law requires child restraints for children age 3 and younger, and only for children riding with residents.
Child Passenger Safety	H-96-015	Review existing laws and enact legislation, if needed, that would eliminate the exemption for children to substitute seat belts in place of child restraint systems.	Alabama allows children age 4 to age 8 to use seat belts.
Child Passenger Safety	H-96-016	Review existing laws and enact legislation, if needed, that would require children 8 years or older to use seat belts in all vehicle seating positions.	Alabama's child passenger safety law requires 4 and 5 year olds to use seat belts, no matter, their seating position, but only when riding with residents. All other children age 6 and older are covered by Alabama's seat belt law, which applies only to the front seat.
Child Passenger Safety	H-97-001	Enact legislation to require transporting children age 12 years and younger in a rear seat of a passenger vehicle if a rear seating position is available. The child should be restrained in accordance with the state's child restraint law.	Alabama has conducted education campaigns on the safety benefits of transporting children in the back seat. Alabama, however, does not require transporting children age 12 years and younger in a rear seating position.
Occupant Protection	H-97-002	Enact legislation that provides for primary enforcement of mandatory seat belt use laws, including provisions such as the imposition of driver license penalty points and appropriate fines. Existing legal provisions that insulate people from the financial consequences of not wearing a seat belt should be repealed.	Alabama authorizes primary enforcement of its seat belt law, but applies it only to front seat vehicle occupants and imposes only a $25 fine. Alabama does not impose driver license penalty points and does not reduce financial damages for people not using their seat belt.
Occupant Protection	H-97-006	Incorporate the standardized data collection/data elements guidelines for traffic crashes developed by the NHTSA, the FRA, and National Association of Governors' Highway Safety Representatives into your police accident reporting forms.	Alabama does not and has not indicated that it will incorporate the model Minimum Uniform Crash Criteria as a guideline for consistent crash data collection.
School Bus Occupant Protection	H-99-022	Require that all vehicles carrying more than 10 passengers (buses) and transporting children to and from school and school-related activities, including, but not limited to, Head Start programs and day care centers, meet the school bus structural standards or the equivalent as set forth in 49 *Code of Federal Regulations* Part 571. Enact regulatory measures to enforce compliance with the revised statutes.	V. Alabama does not have a law or regulation that requires all schools (public and private) and day care centers transporting children to and from school and school-related activities in vehicles that carry more than 10 children to use vehicles that meet the school bus structural standards or the equivalent as set forth in 49 CFR Part 571.

Subject	Ref.	Recommended Text	Status of Implementation
School Bus Occupant Protection	H-99-023	Review your State and local laws and, if applicable, revise to eliminate any exclusions or exemptions pertaining to the use of age-appropriate restraints in all seat belt equipped vehicles carrying more than 10 passengers (buses) and transporting school children.	Alabama's child passenger safety law does not impose the appropriate child passenger safety protections for children riding in seat belt equipped vehicles carrying more than 10 passengers.
Motor Carrier	H-00-020	Once your State has ensured that adequate parking is available, eliminate or modify those time limits at public rest areas that can prevent truck drivers from obtaining adequate rest or redirect drivers to nearby parking facilities where they can obtain adequate rest.	The Board is aware that Alabama is addressing its shortage of public spaces with an ongoing refurbishing plan that will double or triple the amount of spaces for commercial trucks. What is the current status of this program?
School Bus	H-01-038	In cooperation with the National Association of State Directors of Pupil Transportation Services, develop and implement a program of initiatives for passive grade crossings and school buses that includes (1) installation of stop signs at passive crossings that are traversed by school buses except where an engineering study shows their installation would create a greater hazard; (2) use of information about whether school buses routinely cross passive grade crossings as a factor in selecting crossings to upgrade with active warning devices; (3) a requirement that all newly purchased and in-service school buses be equipped with noise-reducing switches; (4) enhanced school bus driver training and evaluation, including periodic reviews of on-board videotapes where available, especially with regard to driver performance at grade crossings; and (5) incorporation of questions on passive grade crossings in the commercial driver's license manual and examination.	Alabama addresses 1 of the 5 elements in this recommendation by having school boards work with the DOT on the grade crossing inventory when considering whether to upgrade a crossing with active warning devices. However, Alabama has not taken action on the other 4 elements. For example, while training for school bus drivers emphasizes the need to stop at all crossings, there is no evidence that Alabama conducts periodic reviews or other evaluations to ensure that drivers follow their training. Although the Department of Education reviews annual routes and distributes information to the districts, Alabama has not installed stop signs at passive grade crossings traversed by school buses. Alabama has taken no action on noise reducing switches.
Teen Driving, Passenger Restriction	H-02-030	Restrict young, novice drivers with provisional (intermediate) licenses, unless accompanied by a supervising adult driver who is at least 21 years old, from carrying more than one passenger under the age of 20 until they receive an unrestricted license or for at least 6 months (whichever is longer).	Alabama prohibits intermediate driver license holders from carrying more than 3 passengers.
Teen Driving	H-02-031	Require that the supervising adult driver in the learner's permit stage of your graduated licensing law is age 21 or older.	The Board has not received information from Alabama on this recommendation, although the Board is aware that Alabama has considered applicable legislation.
Teen Driving, Cell Phones	H-03-008	Enact legislation to prohibit holders of learner's permits and intermediate licenses from using interactive wireless communication devices while driving.	The Board has not received information from Alabama on this recommendation, nor is the Board aware of applicable legislation.

Subject	Ref.	Recommended Text	Status of Implementation
Cell Phones	H-03-009	Add driver distraction codes, including codes for interactive wireless communication device use, to your traffic accident investigation forms.	Alabama does include a driver distraction code on its traffic accident investigation forms, but does not include a code for cell phone use.
15 Passenger Vans	H-03-019	Establish a driver's license endorsement for 12- and 15-passenger vans that adopts the standards established by the American Driver and Traffic Safety Education Association; to obtain the endorsement, drivers should have to complete a training program on the operation of 12- and 15-passenger vans and pass a written and skills test.	The Board has not received information from Alabama on this recommendation.
Hard Core Drinking Driver	H-00-026	Establish a comprehensive program that is designed to reduce the incidence of alcohol-related crashes and fatalities caused by hard core drinking drivers and that includes elements such as those suggested in the National Transportation Safety Board's Model Program.	The model program includes 15 elements: administrative license revocation, 5 vehicle sanctions, sobriety checkpoints, enhanced penalties for high BAC offenders, zero BAC restrictions for repeat offenders, alternatives to incarceration (home detention with electronic monitoring, intensive supervision probation, dedicated DWI treatment facilities), restrictions on plea bargaining, eliminating diversion, use of specialized court-based programs and programs to identify suspended drivers, and at least a 10-year look-back period. Alabama does not have vehicle immobilization, vehicle confiscation, or ignition interlock. The vehicle impoundment provisions are extremely limited and only apply to drivers arrested for driving on a suspended license. While Alabama does confiscate vehicle registration upon the 2nd or subsequent conviction, it would be more effective if Alabama allowed police officers to confiscate license plates at the time of arrest. Alabama does not have a high BAC limit or zero BAC restriction for repeat offenders, does not prohibit plea bargaining, and does not prohibit diversion for DWI offenders. The alternatives to incarceration should be expanded so as to be available for 1st, not just 4th, DWI offenders. The look-back period should be expanded from 5 years to 10 years. And Alabama should consider special courts and programs to identify drivers operating vehicles on a suspended license.

APPENDIX D
Pertinent Alabama Legislation

§ 32-3: STATE SAFETY COORDINATING COMMITTEE

§ 32-4: COORDINATOR OF HIGHWAY AND TRAFFIC SAFETY

STATE SAFETY COORDINATING COMMITTEE

Section 32-3-1

Establishment; composition; terms of members.

There is hereby established a committee to be designated the State Safety Coordinating Committee which shall be composed of the Governor as chairman thereof, the Director of Public Safety, the Director of the State Department of Transportation, two members of the Senate appointed by the President of the Senate, two members of the House appointed by the Speaker, the Attorney General, the Administrator of the state Alcoholic Beverage Control Board, the State Toxicologist and the Chief Justice of the Alabama Supreme Court and a person appointed by the Governor for a term of four years from the state at large. The same per diem allowance and travel expenses paid state employees will be paid to the Governor's appointee. Thereafter, he shall serve four-year terms. The ex officio members shall serve until the expiration of the terms for which they have been elected. The appointive members shall serve for the terms for which they have been appointed.

(Acts 1965, 1st Ex. Sess., No. 92, p. 107, §1; Acts 1982, 2nd Ex. Sess., No. 82-708, p. 166.)

Section 32-3-2

Time and purpose of meetings.

The State Safety Coordinating Committee shall meet regularly upon call of the Governor for the purpose of exploring every facet of the complex problem of traffic safety; to identify major highway and traffic problems; to formulate concrete plans of action to meet those needs; to establish a schedule of priorities for action; and to coordinate the separate programs adopted by traffic officials in all executive branches of state government, as well as those of county and municipal governments, and those of civic, commercial, industrial, labor, fraternal, religious, educational and national organizations in a major effort to promote all aspects of public safety.

(Acts 1965, 1st Ex. Sess., No. 92, p. 107, §2.)

Section 32-3-3

Problems to be specifically studied.

The State Safety Coordinating Committee shall study specifically the problems of interstate and intrastate highway safety; the feasibility and advisability of the adoption of interstate highway safety compacts; the adoption of uniform laws and ordinances, uniform signs, signals and markings; the means of obtaining more uniform enforcement of traffic laws, the use of motor vehicle safety equipment; and the problem of engineering safety control in roads and highways.

(Acts 1965, 1st Ex. Sess., No. 92, p. 107, §3.)

Section 32-3-4

Recommendations of committee.

The State Safety Coordinating Committee shall also from time to time make recommendations to the Legislature for the enactment of laws designed to promote improvement in existing programs of highway safety and for the adoption of additional programs or measures as may be considered necessary and advisable to accomplish the objects of the committee.

(Acts 1965, 1st Ex. Sess., No. 92, p. 107, §4.)

Section 32-3-5

Administrative expenses.

The State Safety Coordinating Committee is hereby authorized to expend for payment of administrative expenses heretofore or hereafter incurred in its program any funds appropriated to it by Section 32-5-313
(Acts 1965, 1st Ex. Sess., No. 92, p. 107, §5.)

Section 32-3-6

Allocation of funds — Highway and traffic safety programs.

The State Safety Coordinating Committee is hereby authorized to allocate any funds appropriated to it to the office of the coordinator of highway and traffic safety for expense of highway and traffic safety programs and for participation to secure benefits available under the National Highway Safety Act of 1966, and all subsequent amendments thereto, and similar federal programs of highway and traffic safety.
(Acts 1971, No. 957, p. 1716, §1.)

Section 32-3-7

Allocation of funds — Department of Education or any educational institution for pre-licensing driver education and training program.

The State Safety Coordinating Committee is hereby authorized to allocate any funds appropriated to it to the Department of Education or to any educational institution in Alabama for the sole purpose of instituting and conducting a program of pre-licensing driver education and training. All funds so allocated shall be set up in a special fund in the State Treasury known as the "Driver Education and Training Fund" which shall be used solely for the purpose of carrying out the provisions of this section.
(Acts 1973, No. 1137, p. 1921; Acts 1977, No. 501, p. 657.)

COORDINATOR OF HIGHWAY AND TRAFFIC SAFETY

Section 32-4-1

Short title.

This chapter shall be known as, and may be cited as, the "Highway and Traffic Safety Coordination Act of 1967."
(Acts 1967, No. 270, p. 775, §1.)

Section 32-4-2

Declaration of policy; authority of Governor.

It is the public policy of this state in every way possible to reduce the number of traffic accidents, deaths, injuries and property damage through the formulation of comprehensive highway and traffic safety programs. The Governor, as the chief executive and highest elected official of this state, is hereby invested with the power and authority to act as the chief administrator in the formulation of such programs on highway and traffic safety.
(Acts 1967, No. 270, p. 775, §2.)

Section 32-4-3

Coordinator of Highway and Traffic Safety — Office created; appointment; term of office; duties.

There is hereby created within the executive department of the state government, and immediately under the supervision of the Governor, the office of Coordinator of Highway and Traffic Safety. The coordinator shall be appointed by the Governor, and shall serve at the pleasure of the Governor. The coordinator shall advise with and assist the Governor in the formulation, coordination and supervision of comprehensive state and local highway and traffic safety programs to reduce traffic accidents, deaths, injuries and property damage within this state. The coordinator, acting under the direction and supervision of the Governor, shall also advise the various departments and agencies of state government concerned with highway and traffic safety programs. He shall coordinate and review, cooperatively, the programs developed by the various local political subdivisions, for the purpose of assisting them in the preparation of their highway traffic safety programs to insure that they meet the criteria established for such programs by the appropriate state and federal authorities.
(Acts 1967, No. 270, p. 775, §3.)

Section 32-4-4

Coordinator of Highway and Traffic Safety — Quarters; staff; supplies.

The Governor is authorized to provide and designate for the use of the coordinator such space as shall be necessary to quarter the coordinator and his staff. The coordinator is authorized to employ and secure the necessary staff, supplies and materials to carry out the provisions of this chapter, subject to the approval of the Governor, under the provisions of the Merit System.
(Acts 1967, No. 270, p. 775, §4.)

Section 32-4-5

Participation in benefits of National Highway Safety Act of 1966; standards and programs of political subdivisions.

The Governor is hereby authorized and granted the power to contract and to exercise any other powers which may be necessary in order to insure that all departments of state government and local political subdivisions participate to the fullest extent possible in the benefits available under the "National Highway Safety Act of 1966" and all subsequent amendments thereto and similar federal programs of highway and traffic safety. The Governor is hereby authorized to formulate standards for highway and traffic safety programs for political subdivisions to assure that they meet criteria of the national highway safety bureau, or its successor, and shall institute a reporting system for the local political subdivisions to report the status of their programs to the state.
(Acts 1967, No. 270, p. 775, §5.)

Section 32-4-6

Cooperation with and participation in programs of federal and other agencies.

The Governor, acting for and in behalf of the State of Alabama, is authorized to cooperate with, and participate in, the programs of all federal, state, local, public and private agencies and organizations in order to effectuate the purposes of this chapter.
(Acts 1967, No. 270, p. 775, §6.)

Section 32-4-7

Powers of local governing bodies.

The governing authorities of the various counties and municipalities are empowered to contract with the state, federal and other local, public and private agencies and organizations and exercise other necessary powers to participate to the fullest extent possible in the highway and traffic safety programs of this state, the provisions of the "National Highway Safety Act of 1966" and all subsequent amendments thereto and similar federal programs of highway and traffic safety.
(Acts 1967, No. 270, p. 775, §7.)

APPENDIX E

Elaboration on Risky Driving Characteristics and Recommended Countermeasures

ALCOHOL/DRUGS ACTION ITEMS

No other single causal entity can be tied to as many fatalities as the use of alcohol/drugs while driving. Approximately 40% of fatalities are caused by alcohol/drugs. Planned action items follow.

- (Community Traffic Safety Program (CTSP) Coordinator) Establish mechanisms that consider the entire systems affect of alcohol countermeasures, and the downsides that each may present to the total system. For example, increased enforcement coupled with mandatory jail sentences may so bog down the prison systems as to make judges reluctant to convict. This would be a function that could be served by the Governor's Task Force against Drinking and Driving.
- (CTSP Coordinator) Activate the Governor's Task Force against Drinking and Driving, and integrate it into the efforts of SMART.
- (ADECA) Develop and implement a statewide alcohol Public Information & Education campaign.
- (ADECA) Coordinate and facilitate a statewide DUI workshop.
- (ADECA) Implement publicity efforts by utilizing key events and activities like the Governor's Safety and Health Conference planning committee, and Operation Lifesaver.
- (ADECA; CTSPs) Develop local alcohol safety plans and councils to formulate problem-solving strategies and to transfer alcohol crash countermeasure technology.
- (ADECA; Department of Education) Provide education to school age children in grades K-12 on alcohol awareness as part of a comprehensive program of traffic safety.
- (ADECA; CTSPs, DPS, Local Police) Apply police traffic services to the problem of alcohol and drugs – this is covered in more detail below under "Police Traffic Services."
- (Alabama Department of Forensic Sciences) Provide uniform training in the Standardized Field Sobriety Test Battery (SFSTB), Breath Alcohol Screening Devices (BASD) to adhere to changes in Alabama's Traffic Laws (Act 96-324), which requires consistent calibration.
- (Alabama Alcoholic Beverage Control Board) Expand the dispenser awareness program into a mandatory training course.
- (ADECA) Expand statewide the program to coordinate college personnel and activities involving the prevention of drug/alcohol driving will.
- (Community Services of West Alabama) Establish teen alcohol outreach and peer counseling designed to reach underage youth to deter alcohol use, and to encourage youth who have participated to refrain form further use.

OCCUPANT PROTECTION ACTION ITEMS

Alabama passed a primary safety belt law in June 1999 with an effective date of enforcement of December 10, 1999. As a result, in 2001 and 2002 Alabama's safety belt rate was 79 percent, the highest safety belt usage rate ever recorded in state history. However in 2003, Alabama's

rate dropped two percentage points to 77 percent but continued to exceed the national average of 75 percent.

The state's primary law stipulates that each front seat occupant use a correctly fastened safety belt when the vehicle is in motion. As more emphasis is placed on the enforcement of the primary law, it is anticipated that Alabama's safety belt rate will continue to increase. The following activities are planed in this area:

- (Ongoing, ADECA) Continue the promotional and educational campaigns to reinforce the importance of safety belt usage and serve as a strong reminder of the Alabama Primary Safety Belt Law. Public information and Educational (PI&E) programs will serve three purposes: (1) educate the motoring public on the devastating problem of motor vehicle crashes, (2) demonstrate the effectiveness of safety belt use, and (3) inform motorists of the enforcement of the state's safety belt and child restraint laws. Recognize that PI&E is not effective without strong enforcement.
- Increase police emphasis on restraint enforcement (this will be covered further in the "Police Traffic Services" section.
- (Ongoing, ADECA) Coordinate the activities of the nine regional highway safety coordinators, the Alabama Department of Public Health, the Alabama Department of Public Safety, local law enforcement agencies, governmental agencies and other organizations to promote the Click It or Ticket safety belt campaign during major holidays.
- (ADECA) Expand the Click It or Ticket campaign efforts to be an ongoing, year-long program.
- (Ongoing, ADECA, Section 157 Program) Conduct area briefings, establish partnerships, employ the media, conduct training, and perform rigorous law enforcement of the state's occupant protection laws. Specifically:
    - Conduct Special Traffic Enforcement Programs (also known as Blitz programs) in nine Community Traffic Safety Program regions and in jurisdictions near 12 Department of Public Safety posts, as well as conduct a statewide Department of Public Safety STEP Program.
    - Utilize the services the two full-time Law Enforcement Liaisons to work with the Project Director and local, state and federal departments and agencies.
    - Implement an Incentive/Recognition Program for law enforcement officers who participate in the Blitz program.
    - Provide training in the areas of child passenger safety and occupant protection
    - Secure the services of a public affairs firm to implement a public information campaign.
- (Ongoing, ADECA) Provide educational programs and technical assistance (brochures, advertising campaign, and other informational materials) throughout the state.
- (ADECA, DPS) Develop special programs to concentrate on low safety belt and child restraint usage groups, e.g., teens, minorities, and those in lower socioeconomic classes.
- (Ongoing, Alabama Department of Public Health) Perform activities to increase restraint use, including: (1) plan and promote "Buckle Up! America Week;" (2) coordinate and implement "Buckle Up! Alabama" poster contest statewide for elementary school students; (3) coordinate and implement an essay contest statewide for junior high school students; (4) plan program in western counties of Alabama, known as the Black Belt, in order to network with local and county agencies to promote safety belt usage; and (5)

continue routine tasks, such as attend workshops and meetings, conduct media appearances and interviews and distribute informational materials.

- (Ongoing, ADECA Section 405 & Section 2003 and Alabama Safe Kids) Conduct standardized Child Protection System (CPS) training as well as CPS checks and clinics, and increase the size of the trained personnel pool qualified to conduct CPS clinics and training throughout the state.
- (Ongoing, ADECA 2003 B program) Provide a comprehensive educational program designed to heighten community awareness, provide CPS information, train and certify CPS technicians and establish car seat checking stations along corridor 80/82.

POLICE TRAFFIC SERVICES ACTION ITEMS

Police Traffic Services countermeasures include all traffic enforcement efforts as well as the various publicity efforts that are facilitated by State and local police departments. They specifically include alcohol/drug and restraint enforcement and PI&E. However, they will also include all other aspects of enforcement, most violations of which involve risky behavior. As identified in the statewide problem identification, speeding and exceeding safe speed are over-represented where there is recorded alcohol involvement. Both speed and alcohol are high injury and fatal crash causative factors. Most severe crashes involving these factors occur from about sundown to sunrise and are over represented on weekends. Countermeasures under consideration follow.

- (Ongoing, ADECA Section 157, DPS and Local Police agencies) Enforce Alabama's Primary Safety Belt Law by means of Selective Traffic Enforcement Programs (STEPs), which are implemented in conjunction with educational campaigns (PI&E).
- (ADECA, DPS) Purchases video equipment to support police STEP efforts.
- (ADECA, ACJIC) To increase officer productivity, purchase laptop computers and obtain field Internet connectivity to implement the e-citation pilot programs, and promote the use of the Law Enforcement Tactical System (LETS) at check-stops (according to the "Red Level" model).
- (Ongoing, ADECA) Provide funding for overtime for all STEP and check-stop activities through the Community Traffic Safety Programs (CTSPs). All STEPs support the NHTSA-sponsored holiday enforcement blitzes such as Memorial Day, Independence Day, Thanksgiving, and Christmas/New Years.
- (Ongoing, ADECA , Alabama Department of Public Safety) Implement a special overtime effort to conduct a statewide rural STEP project aimed at identified segments of roadway with high crashes, including D.U.I. enforcement, safety belt and child seat enforcement as well as strict enforcement of posted maximum speed limits.
- (Ongoing, ADECA) Continue the statewide public information campaign aimed at seatbelt use, driving under the influence, and speed enforcement, including public service announcements for both radio and television and various handout materials.

YOUTH-TARGETED ACTION ITEMS

By youth, we refer to two age groups: 16-20 year old drivers for non-alcohol related risk taking, and 19-23 year old drivers in alcohol related risk taking. Figure E-1 demonstrates the reason that young drivers in these age groups should be targeted for countermeasure actions.

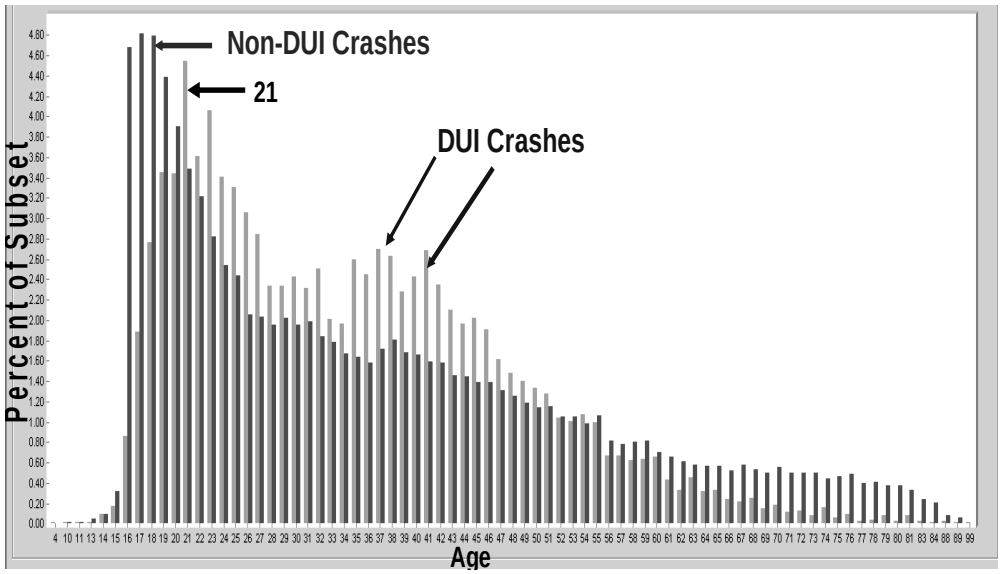


Figure E-1: Age differential in Alabama DUI crashes

It is clear that the 16-19 year olds are under-represented in DUI crashes in comparison to their overall crash records. However, the under-representation after age 18 is more attributable to their excessive crashes in general than to the lack of alcohol involvement. The linear increase in the direction of the 21-year old driver is quite interesting, indicating as they get closer and closer to the peer-age of "legalized drinking," they are much more apt to be involved in DUI crashes. The proportion for 17 year olds is about twice that for 16 year olds, and it continues to increase by almost this amount for ages 18 and 19, and levels out at 20. The huge over-representation of 16-20 year old drivers in general is the product of a combination of risk taking (mostly separate from the use of alcohol), and inexperience. It is impossible to distinguish these two causes, and it can be reasoned that inexperience is one major cause of risk-taking, although clearly not the only one.

The alcohol problem does not become pronounced until age 19, and it becomes dramatically over-represented at 21. This continues throughout the 20s and seems to diminish somewhat in the early 30s. What about the large over-representations in the late 30s and early 40s? These problems are caused largely by what are referenced in the traffic safety community as "problem drinkers." While these will not be the subject of this component of the plan, our hope is that by establishing habits of behavior in the early driving years, these will continue throughout life, thus ultimately impacting the older subset as well.

A preliminary comparison of alcohol crashes of the 19-23 causal driver age group with their counterparts who were 24 years of age and older produced the following differences (CY 1998-2002 Alabama data – generally ordered by significance):

- Time of crashes are later, as discussed above, and they are more likely to occur on weekends,
- Causal vehicle typically contains multiple occupants, leading to the expected over-representation in multiple-injury crashes,
- The cities of Auburn, Tuscaloosa and others containing college campuses are dramatically over-represented,
- Younger drivers are typically the driver of the second vehicle when a second vehicle is involved (second vehicles are involved in less than 43% of cases),
- The crash is more apt to be a single-vehicle, run-off the roadway crash than a crash with another vehicle,
- The causal driver is more likely to be driving at higher rates of speed,
- The driver's license of the causal driver is less likely to be revoked, reflecting that this is more apt to be a first offense or incident,
- The causal vehicle is more likely to be disabled, indicating greater severity,
- The causal driver is much more likely to be in the lower BAC categories, i.e., all categories below 0.199%,
- The crash is more likely to occur on a curve and/or a downgrade, or on a segment immediately following a sharp curve,
- Males are over-represented, accounting for 85% of crashes in the 19-23 age classification as opposed to about 80% in the older age classification.

Other significant variables also indicated a greater lack of judgment on the part of these drivers, e.g., the over-representation of their crashes in fog.

As discussed above, risky behavior and inexperience go hand in hand for the 16-20 age group, and they are not mutually exclusive. Planned CHSP activities will focus primarily on risky behavior because experience cannot be manufactured or controlled practically other than through countermeasures that have long been in place. On the other hand, risk-taking behavior can be modified, and therefore it shows the best promise for the reduction in injury caused by young drivers.

The age distribution in Figure E-1 demonstrates quite clearly from a pure frequency point of view that the ages 16-20 are very highly over-represented for crashes in general and non-alcohol-related crashes in particular. This age group is also significantly over-represented in its share of injury and fatal crashes, i.e., they are causing more than their share of injuries and deaths on a per crash basis. One major cause for the shape of this chart's distributions is the amount of driving being done within each age group. For example, the low proportions at the chart's upper end are due to the lack of driving by individuals in the older age groups, coupled with the relatively few persons in each of these age groups. However, there is no way that it can be reasoned that the high proportions of crashes in the 16-20 age group is due to their excessive miles driven, since their mileage cannot begin to compare to the professional drivers and parents in the center of the distribution. If this chart were transformed into crashes per million vehicle miles driven, the disparity in the 16-20 age group would become even more pronounced.

Table E-1 presents contributing circumstances for 16-20 year old causal drivers as compared with their 35-64 year old counterparts. The 35-64 age grouping was chosen for comparison

purposes to exclude the risky driving aspects that might still be present in the 20's as well as the effects of aging in the 65 and older group. (Excluded from Table E-1 are all primary contributing circumstances that had less than 35 instances over the five years of the study (1998-2002.)

Those primary contributing circumstances that are considered to be related in any way to risky driving behavior are shown in **bold.** Some of them are arguably closely related to inexperience, and these interactions were discussed previously. This reports errs on the side of including all driving violations for which there seemed to be control on the part of the driver (i.e., which could have been prevented by adequate risk avoidance). It is interesting that some of these categories are significantly over-represented in the 35-64 age group.

Table E-1: Age comparison of primary contributing circumstances for injury/fatal crashes

Primary Contributing Circumstances	Age 16-20 Frequency	Age 16-20 Percent	Age 35-64 Frequency	Age 35-64 Percent	Over Representation
Over Speed Limit	3076	8.602	1408	2.633	3.267*
Driver Not In Control	6182	17.287	6989	13.070	1.323*
Improper Driving/Environ	1732	4.843	2073	3.877	1.249*
Avoid Object/Person/Vehicle	1947	5.444	2560	4.787	1.137*
Vehicle Left Road	939	2.626	1127	2.108	1.246*
Misjudge Stop Dist	3149	8.806	4501	8.417	1.046
Improper Passing	362	1.012	401	0.750	1.35*
Vision Obstruction	259	0.724	294	0.550	1.317*
Wrong Side Of Road	749	2.094	1031	1.928	1.086
Following Too Close	2153	6.021	3235	6.050	0.995
Defective Equipment	587	1.641	950	1.777	0.924
Improper Turn, U-Turn	292	0.817	547	1.023	0.798*
Pedestrian Violation	179	0.501	483	0.903	0.554*
Other	515	1.440	1020	1.907	0.755*
Fail To Yield Row	6342	17.734	9809	18.343	0.967
Improper Lane Change/Use	344	0.962	845	1.580	0.609*
Unknown	409	1.144	944	1.765	0.648*
Driver Condition	1153	3.224	2277	4.258	0.757*
Fail To Heed Sign/Signal	2337	6.535	4056	7.585	0.862*
Unseen Object	1699	4.751	3417	6.390	0.744*
Dui	1171	3.275	4783	8.945	0.366*
Risky Behavior Percentage		77.384		67.429	

The proportion of these crashes for the age 16-20 group is 77.384%, while for the 35-64 age group is it about 10% less. This is quite significant for this sample size. Even more important are the categories at the top of the list which are most over-represented for the younger drivers. The asterisk (*) on the "Over Representation" column indicates that the difference between the proportions is statistically significant (at least the 99% level). The proportion of crashes in which the reported primary contributing circumstance was speeding was over three times as much for the 16-20 age group as it was for the 35-64 age group.

This and most of the other over-represented categories of contributing circumstances are particularly important in explaining the reason that younger drivers generally account for a higher severity of crash than their older counterparts. While inexperience may account for the increased frequency of many of these crashes, there is little doubt that risk acceptance accounts for the relatively high severities noted above. This is an important aspect of reducing fatalities and the worst injuries caused by young drivers.

To further investigate this finding, the 16-20 aged causal drivers were compared with all drivers of age 24 and greater (the 21-23 age group was omitted since they were also expected to show risk-taking tendencies). Alcohol crashes were excluded from both sides of this comparison to keep it from masking other risk-taking behaviors. The following observations further established the pattern noticed above (CY1998-2002 Alabama data, generally ordered by significance):

- Time: before and after school were very highly over-represented, followed by late night and early morning hours correlated heavily toward weekends,
- Multiple occupants in the vehicle, and correspondingly, multiple injuries were over-represented,
- A greater than expected proportion of disabled and towed vehicles, indicating more severe crashes, reflected in more injury and fatal crashes,,
- Greater proportion of driving on county two-lane roadways, which tend to be more hazardous than four-lane and state roadways,
- More than expected driving in open country, residential, and school zones,
- Single vehicle off-the-roadway crashes are over-represented as opposed to two-vehicle crashes (this is an indication of unforced errors on the part of the causal driver),
- Restraint use is under-represented,
- More crashes than expected in rainy weather.

In summary, these results indicated over-representations in most attributes that might indicate the inclination toward risky driving behavior.

Planned action items include the following:

- (ADECA; Department of Education) Develop and implement an “early education” program starting in grade schools and providing reinforcement over a 10-15 year period. Its main goal will be to counter the drinking portrayed in the media as the “fun and adult” thing to do. This should seek for an optimal mix between portraying the graphical injury/death consequences of risky behavior as opposed to the social and license sanction consequences.
- (ADECA; Department of Education) Develop a second component, aimed at parents, for the program in the first bullet of this list.
- (ADECA) Establish a mechanism to promote alcohol free events for colleges.
- (ADECA) Promote education on traffic safety and alcohol use at college orientation or through some type of freshman class; consider using voluntary celebrities/sports figures (alumni) to speak on lifestyle choices. This needs to be refreshed periodically throughout the academic career.
- (ABC; ADECA) Work with universities to develop and incorporate messages on their web sites or through e-mail. Universities could allow all of the userids of their students

to be contacted. Pop-up messages could appear on their web sites with responsible drinking messages.